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NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER SAN DIEGO, CALIFORNIA 92152

NPRDC TR 76-22 NOVEMBER 1975

SHIPBOARD FACILITIES MAINTENANCE AND MANPOWER UTILIZATION: PROBLEM AND APPROACH

Melvin A. Schwartz

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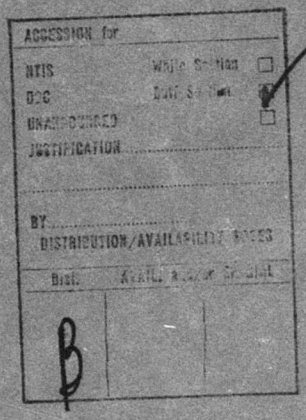
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NPRDC TR 76-22

November 1975

SHIPBOARD FACILITIES MAINTENANCE AND MANPOWER UTILIZATION: PROBLEM AND APPROACH

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SECURITY CLASSIFICATION OF THIS PAGE (When Date Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: NPRDC-TR-76-22
2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle): Shipboard Facilities Maintenance and Manpower Utilization: Problem and Approach
5. TYPE OF REPORT & PERIOD COVERED: Preliminary Report, 1 Oct 1973 to 1 Oct 1974
6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): Melvin A. Schwartz
8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Navy Personnel Research and Development Center, San Diego, California 92152
10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: PE ZF555 25 001, WR 4-0850
11. CONTROLLING OFFICE NAME AND ADDRESS: Navy Personnel Research and Development Center, San Diego, California 92152
12. REPORT DATE: Nov 1975
13. NUMBER OF PAGES: 107 p.
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office): ZF55-525, ZF55-525-001
15. SECURITY CLASS. (of this report): U
15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report): Distribution limited to U. S. government agencies only; test and evaluation; January 1975. Other requests for this document must be referred to the Navy Personnel Research and Development Center.
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)
18. SUPPLEMENTARY NOTES
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)
Test and Evaluation
Reduced Manning
Manpower Utilization
Facilities Maintenance
Motivation
Habitability
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

New concepts for accomplishing shipboard facilities maintenance have been developed which should improve performance, morale, motivation, and training level of shipboard personnel. The concepts involve a new division of labor, specialized training, and the use of new equipment, materials, and procedures.

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UNCLASSIFIED 390 772

SECURITY CLASSIFICATION OF THIS PAGE (When Date Entered)

20. ABSTRACT (Continued)

A test approach has been developed to demonstrate the technical feasibility of the concepts in a Fleet operational environment. The approach includes evaluation of changes in cleanliness and appearance of shipboard spaces, attitudes toward condition of spaces, and skill/knowledge of facilities maintenance personnel.

A set of hypotheses and associated measurement devices have been presented and statistical tests of these hypotheses will be performed following at-sea data collection.

FOREWORD

This research and development is being performed under Work Unit Number WR4-0850 (Shipboard Manning and Automation - Ship Demonstration) in support of the Naval Ship Research and Development Center's (NSRDC) Shipboard Manning and Automation Project (Exploratory Development Task Area ZF555 25 001).

The project, was an outgrowth of the Chief of Naval Operation (CNO) Pilot Program for Reduced Bridge Personnel, initiated in September 1972 in response to CNO/VCNO Action Sheet 333-72 of 13 June 1972. It is one of a series of 6.2 research and development programs with direct laboratory funding to the Navy Ship Research and Development Center (NSRDC) (Code 2784) from the Chief of Naval Material (MAT-03P). NPRDC's research effort began as part of the joint Fleet/Laboratory team established in July 1973 to investigate reduced bridge manning. This research represents a continuing effort to support the Shipboard Manning and Automation Project Office at NSRDC, Annapolis.

The cooperation of LCDR Steve Kmetz (USN) of COMCRUDESGRUTWO/ Destroyer Development Group and Messrs. Larry Cywin and Jack Burwell of the Planning Research Corporation in providing U. S. Fleet Liaison and valuable data to this study effort is gratefully acknowledged. The hospitality and useful information provided by the staff and crew of USS LAFFEY (DD 724) and USS ALYWIN (DE 1081) are also highly appreciated.

Messrs. Mike Heffron and Chuck Bogner, both of the Naval Ship Engineering Center, have been instrumental in furnishing much needed information on habitability and standards for materials.

CDR P. Bryan (RN), British Naval Staff, Washington, D. C. has provided valuable assistance to this effort by furnishing technical information concerning ship husbandry in the Royal Navy. Personnel of HMS SULTAN, the ship husbandry training center of the Royal Navy, Gossport, Hampshire, have contributed a large body of data and materials which have been instrumental in structuring various portions of this study program. These and other data furnished through the Ministry of Defense, Bath, England were made available via the conscientious efforts of Captain T. Barry (USN), Naval Sea Systems Command Technical Representative, Bath, England.

The guidance and innovative ideas of CDR J. Dachos (USN), Project Officer, Shipboard Manning and Automation Project, NSRDC, Annapolis, Maryland, and Mr. J. Corder, also of NSRDC, have been invaluable to this study program.

J. J. CLARKIN
Commanding Officer

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SUMMARY

PROBLEM

Facilities maintenance, as currently performed at sea, requires a considerable expenditure of manhours and material resources. Innovations are being developed that are expected to result in reduced ship manning levels while maintaining or improving the condition, cleanliness, and appearance of shipboard spaces. The innovations fall into three general but interrelated classes: (1) task consolidation and establishment of a specialist facilities maintenance team, (2) introduction of new equipment and materials which will lower the facilities maintenance manpower requirements aboard ship, and (3) the development and implementation of a comprehensive facilities maintenance training program.

Before the concepts can be implemented in the Fleet on an operational basis, their technical feasibility must be evaluated. There are no standard procedures for conducting a comprehensive evaluation of these concepts. A systematic approach is required for evaluation of the effects of changes in organizational structure, methods of training facilities maintenance personnel, and in the equipment, materials, and procedures used for these tasks.

Dependent variables of concern in this evaluation include (1) manning levels required for facilities maintenance, (2) skill and knowledge of personnel performing facilities maintenance, (3) motivation and attitude, and (4) condition, cleanliness, and appearance of shipboard work and living spaces.

OBJECTIVES

The objective of this research is to develop and implement a practical demonstration-test approach and technology for evaluating the technical feasibility of innovations in organization, training and equipment, materials, and procedures for shipboard facilities maintenance.

APPROACH

The approach to this study includes:

- An analysis of facilities maintenance problems and requirements in the Fleet today, emphasizing those associated with manpower utilization and training.
- Generation of innovative concepts (and analytic evaluation of these concepts in terms of potential manpower savings).
- Organization of candidate concepts into an integrated demonstration package for at-sea testing.
- Development of a test plan, data collection devices, and procedures and schedules.
- Installation of the demonstration package aboard a ship.
- Designation of sources of control data.
- Deployment and data collection.
- Data analysis and reporting.

RESULTS

The results of the research effort to date is a test plan, which has been partially implemented, for the evaluation of the feasibility of innovative facilities maintenance concepts. The plan includes a statement of overall approach, a description of data collection devices, the identification of the study setting, and a schedule for installing and testing the innovations.

The effort will consist of performing an operational experiment using a DE 1052 class ship, USS TRIPPE, as the experimental platform and data from other ships of the same class for statistical comparisons. Modifications to the experimental ship will be made in the areas of task organization, training, facilities maintenance equipment, materials, and procedures. Also, modifications will be made to the ship spaces, including the following:

- Installing carpeting
- Installing walk-off mats
- Lacquering brightwork
- Using a specially developed training program for facilities maintenance
- Installing pressure washers, wall detergers, carpet shampooers, vacuum cleaners, and other equipment
- Using management and scheduling aids for facilities maintenance tasks

As of this writing, a number of contracts have been awarded for the acquisition and installation of materials and equipment. They are being assembled at Naval Ship Research and Development Center, Annapolis, and at COMCRUDESGRUTWO/DESDEVGRU, Charleston, S.C. prior to delivery to the ship. The ship selected as the test platform is USS TRIPPE (DE 1075). Test instruments have been drafted and the data analysis techniques have been tentatively selected. The latter includes analysis of variance, simple t tests, and nonparametric techniques where appropriate.

RECOMMENDATIONS

It is recommended that the plan presented in this report be implemented to evaluate the innovations discussed and that the overall approach and test instruments, when complete and evaluated, be used to evaluate additional facilities maintenance concepts in an operational environment.

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INTRODUCTION

BACKGROUND

The Naval Personnel Research and Development Center (NPRDC) research efforts described in this report are in support of the Naval Ship Research and Development Center's (NSRDC) Shipboard Manning and Automation Project. This program, which is an outgrowth of the Chief of Naval Operations (CNO) Pilot Program for Reduced Bridge Manning*, has two major components: (1) the shipboard Demonstration Program, and (2) the Laboratory Development Program.

The essential features of the Shipboard Demonstration Program include:

- Identification and feasibility evaluation of innovative concepts for reducing shipboard manning levels and costs
- Design of demonstration tests for quantitative comparisons of alternative concepts
- Conduct of experiments at sea (data collection)
- Analysis of data resulting from experimentation
- Issuance of recommendations for changes in the Fleet (procedures, equipment, personnel, and organization)

Candidate concept areas in the Shipboard Demonstration Program currently include:

- Maintenance and repair by tenders
- Ship controlman concept
- Facilities maintenance
- Wireless internal communications
- Administrative support concept
- Machinery monitoring

NPRDS personnel participating in the Shipboard Demonstration Program are coordinating their efforts with the Navy Manning Reduction Technology Office, the Coast Guard, the British Navy, the U.S. Naval Academy, and industrial firms.

The Laboratory Development Program is directed toward the research in and development of an Integrated Bridge Control System and an Automated Engineering System. NPRDC is contributing to the manpower aspects of this program.

DEFINITION OF FACILITIES MAINTENANCE

Facilities maintenance comprises those activities performed for purposes of ship preservation, cleanliness, and appearance on nonprimary shipboard systems. (This excludes basic weaponry, command control and communications, maneuvering, and propulsion equipments for the platform.) Specifically, facilities maintenance includes the tasks of surface

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*One of a new series of 6.2 research and development programs with direct laboratory funding to NSRDC from the Chief of Naval Material (CNM).

preparation and corrosion control, painting, chipping, scraping, peeling, grinding, cleaning, stripping, waxing, washing, scouring, scrubbing, swabbing, sweeping, buffing, polishing, lacquering, stenciling, vacuuming and shampooing, garbage disposal and trash removal, and all manner of sanitary and cosmetic practices aboard ships in the U.S. Fleet.

FACILITIES MAINTENANCE PROBLEMS

Facilities maintenance, as currently performed at sea by ship's force, requires a considerable expenditure of manhours and material resources. For example, it is estimated that over 1380 manhours per week, or approximately 27 manweeks (i.e., 27 men working full time) is spent by ship's force performing facilities maintenance work on a DE 1052 class ship*. This approximates 15 percent of the workload for the entire ship. Table 1 presents an example of the manhours allocation, showing the facilities maintenance workload, by division, on a DE 1052.

The theoretical manning levels** of destroyer-class ships consist of approximately 35 enlisted personnel, whose responsibilities are to perform facilities maintenance tasks. Personnel in other divisions are also required to perform these functions for various assigned spaces.

The average annual personnel cost to the Navy for performing shipboard facilities maintenance on destroyer-class ships is estimated to be in excess of $240,700 per ship. The following method was used to obtain this estimate:

$$\frac{(BC)}{(SNH) \times (HY)} \times (FMH) = \text{Average annual cost}$$

where:

BC = average annual cost of a Boatswain's Mate performing facilities maintenance (NAVPERS 15163, July 1973)

SNH = average number of hours in the Standard Navy Workweek (OPNAVINST 5330.8)

HY = Productive weeks in a year, allowing 4 weeks for leave.

FMH = Number of facilities maintenance manhours for destroyer-class ships (from Ship Manning Document for DE 1052)

$$\frac{(\$11,226)}{(70) \times (48)} \times 72,070 = \$240,713.5$$

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*This is a calculated weekly workload from the Ship Manning Document (DE 1052 Class) and is probably a conservative planning estimate. In actual practice, according to many authorities, the number of facilities maintenance manhours is considerably higher.

**Theoretical manning levels refers to what is called for in the Ship Manning Document for the ship class. Actual ship manning levels are usually lower than those found either in the Ship Manning Document or in the official authorization. It should be clear from this and the previous footnote that more facilities maintenance work is already being done by fewer people than is stated in existing requirements documents. This is not to say that the jobs are getting done satisfactorily.

TABLE 1. FACILITIES MAINTENANCE WORKLOAD ON A DE 1052

DIVISION	FACILITIES MAINTENANCE MANHOURS SPENT PER WEEK
X	28.01
OI	84.27
OC	57.36
1ST (Deck Division)	383.59
2nd	34.81
AS	93.05
M	127.75
B	64.05
R	144.49
S	369.58
TOTAL	1,386.96

The major problems associated with current shipboard facilities maintenance in the United States Navy today are as follows:

- The personnel performing the facilities maintenance tasks are usually lower rated men who are neither sufficiently trained nor motivated to perform what is considered menial, offtimes meaningless work.

- Facilities maintenance tasks are currently assigned (perhaps misassigned) to people who enlisted to work in specialty areas, such as electronics maintenance. Yet, during the early part of a recruit's Navy career, the majority of his time is spent doing nontechnical work, such as facilities maintenance. It is a fact that a large percentage of nonreenlistment attrition in the Navy today is due to a lack of job satisfaction. Some authorities have stated that at least part of the job dissatisfaction is due to the disparity between the recruit's expectations and the reality of day-to-day shipboard work. It is reasonable to expect that the current practice of misassigning facilities maintenance work to various would-be specilists contributes to the dissatisfaction and lowers motivation to work and to remain in the Navy.

- The equipment and materials used for facilities maintenance do not reflect the more recent advances in the janitorial services field and in the field of surface preparation. Antiquated methods, equipment, and materials are used for facilities maintenance.

- Ship spaces, particularly on some of the older ships in the Fleet today, have not been designed with facilities maintenance in mind. For example, the tile decking materials in use now require frequent stripping, washing, buffing, and polishing. Overheads on ships are usually mazes of pipes, wires, and other dust and dirt collecting structures which are difficult and time-consuming to clean.

- Standards for appearance and cleanliness have not been defined in sufficient detail to permit proper evaluation and work scheduling. Too much of the facilities maintenance work done aboard today's ships is performed because of a forthcoming visit by a senior officer, and not enough because of a legitimate technical requirement. Too often surfaces are painted merely to maintain appearance. In fact, some painting currently performed aboard ship makes facilities maintenance more difficult and time-consuming in the

long run because of poor surface preparation* and an inability to recognize the need for good surface preparation. Too often strong cleaning chemicals are applied to the wrong surfaces and cause damage.

- There is no adequate system for keeping track of spaces requiring facilities maintenance, skills required for various tasks, estimated job time, etc. also, there is insufficient technical documentation regarding methods and techniques for surface preparation, corrosion control, and cleaning operations. This is difficult to understand because management information systems and documentation concerned with preventative and corrective maintenance on primary weapon and machinery systems have been developed and implemented in the Fleet with considerable success (demonstrated reduced maintenance time, increased reliability, and more confidence in equipment). Manuals concerned with preservation of ships (e.g., NAVSHIPS Technical Manual 091-190-0002 of January 1970) are not written so that they can be understood and used by the population of personnel who are currently required to perform the tasks.

There have been numerous attempts in the past to identify and deal with problems associated with shipboard facilities maintenance and many "solutions" have been offered. Yet the same problem seems to recur in the literature with minor variations in phraseology. For example, NAVMMACLANT Report No. 99 (p.v.) of September 1972 states:

". . . The course of the study developed the conclusions that:

a. Ineffective and inefficient materials are used in shipboard cleaning and painting.

b. The availability/accessibility of proper tools to perform FM tasks effectively is adequate (sic).

c. There is a lack of scheduling for FM functions to be performed.

d. There is inadequate preparation of surfaces prior to painting.

e. There is unnecessary painting of surfaces.

f. Cleaning materials are used for rust removal which is in violation of NAVSHIPS instructions.

RECOMMENDATIONS

a. Implement the cleaning and painting materials outlined in Appendix C.

b. Provide the tools outlined in Appendix B.

c. Schedule FM functions, with priorities assigned to each task to be performed. as indicated. . ."

Enclosure 1 of FLEWORKSTUDYGRULANT Report No. 28, published in 1965, states:

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*If the surface was not adequately prepared prior to the application of paint, the new paint will not adhere properly and will blister, crack, or otherwise present a poor appearance. Also possible structural damage, due to neglect of the substrate, is possible.

". . . analysis of the present cleaning procedures revealed that the required cleaning tasks had never been accruately measured, resulting in a lack of work scheduling, organization and effective manpower utilization. . .While investigating the cleaning materials in use, it was determined that some cleaning agents, such as scouring powder and alkaline soap powder, are causing pitting and cracking. The cleaning materials and equipment were found to be outdated, resulting in slow and tedious cleaning procedures, thus wasting manpower."

Recommendations emanating from studies such as these include a variety of individualized solutions ranging from using disposable mess gear and providing better facilities maintenance equipment and materials to developing job scheduling aids.

The question may well be asked at this point, "Why, in view of all the technological developments in the janitorial services area and in the field of habitability materials, do the same old problems continue to be cited in reports? Why aren't the various 'solutions' implemented in the U.S. Fleet?"

There are three basic reasons for the inability to deal effectively with the reported facilities maintenance and manpower problems.

First, approaches used in the facilities maintenance and habitability studies are, for the most part, molecular in nature. In other words, they tend to deal separately with such items as decking, bulkhead materials, cleaning equipment, etc. Generally speaking, these studies fail to consider a variety of important interactions among the materials, personnel, training, organization, shipboard environmental features, and equipment. Unless the research community and the Fleet can come to grips with these interactions and treat the entire problem, the individual problems and solutions (proposed) will continue to occupy low and inconsistent positions on the Navy's priority scale.

Second, even in those studies which do attempt to consider some of the major interactions, criteria and standards for evaluation are rarely operationally defined. As an example, researchers in habitability often speak of improved motivation and efficiency, but rarely attempt to define those terms such that measures could be obtained to demonstrate improvements.

Third, it is a rarity to find research programs which have the funding and/or authority to proceed beyond the work study or conceptual phases into an actual demonstration/test phase in which environmental controls and operational fleet units are used. Without demonstration testing, there is a low probability of acceptance by Fleet units.

A significant potential for overcoming these three difficulties lies in the Shipboard Demonstration Program.

THE SHIPBOARD MANNING AND AUTOMATION PROJECT: SHIPBOARD DEMONSTRATION PROGRAM

In the latter part of 1972, a pilot program for reduced bridge manning was established at the Naval Ship Research and Development Center (NSRDC), Annapolis, Md. The program was in response to the Chief of Naval Operations/Vice Chief of Naval Operations Action Memorandum 333-72. The program, sponsored by the Chief of Naval Material, is a direct laboratory-funded effort and involves NSRDC, NPRDC, and COMCRUDESGRU2/DESDEVGRU, Charleston, S.C., as well as several industrial contracting firms.

During the first year of the effort, emphasis was on reduced bridge watch stations. Studies were conducted on 17 operational ships and in mock-up facilities to determine if the number of personnel standing watches on ship's bridges could be significantly reduced without subsequent degradation to mission capability or operational readiness or safety. Findings and conclusions were positive and the technical scope of the program was expanded to include other functional areas such as communications and facilities maintenance. The remainder of this report describes the specific portions of the study porgram concerned with facilities maintenance.

THE SHIP BASED DEMONSTRATION PROGRAM: FACILITIES MAINTENANCE CONCEPT EVALUATION EFFORT

GENERAL

One of the three previously cited hindrances, viz., the difficulty of proceeding beyond conceptual phases of study to demonstration field test, has been overcome with the establishment of the Shipboard Demonstration Program.

The second problem – the failure of past studies to consider interactions among personnel, training, etc. – is attacked in the initial approach (i.e., the organization of the interrelated concept areas). The independent variables in this study will comprise task organization, personnel characteristics, equipment, materials, shipboard environmental characteristics, and training. The dependent measures, as will be seen, constitute skill and knowledge measurements, performance effectiveness (cleanliness and appearance), workload distribution, and attitude and motivation.

The remaining problem, i.e., criteria and standards, will be addressed in the discussion of the test plan methodology.

OBJECTIVE

The objective of the facilities maintenance concept evaluation effort is to devise, implement (on ships in the Fleet), and evaluate an integrated set of concepts relating to facilities maintenance, which may lead to the reduction of manpower and manpower costs, and which will not degrade operational readiness, safety, or mission capability.

SCOPE

For the present, the scope of the program is limited to selected spaces aboard operational ships in the Fleet (emphasizing destroyer-class vessels).

APPROACH

The overall approach to this study includes the following steps:

- Generating specific concepts in each of the areas below.
- Screening concepts in terms of potential manpower savings, safety, cost.
- Working with the Fleet in acquiring a ship for demonstration/testing of the concepts and working with the ship in further concept generation and screening.
- Organizing all candidate concepts into an integrated demonstration package.
- Developing a test plan, test materials, and test schedules.
- Installing the demonstration package aboard ship and designating a source of control data.
- Deploying and data collecting.
- Collecting data on control ship.
- Analysing data, reporting of results and conclusions.

USS TRIPPE (DE 1075) has been selected as the test ship for this study. Preliminary arrangements for the concept implementation have been made in meetings involving the staff of USS TRIPPE, and representatives of NSRDC and DESDEVGRU.

CONCEPT AREAS AND IMPLEMENTATION SCHEME

Following an examination of the facilities maintenance problems, concepts in three interrelated areas have thus far been generated. These areas are described in the following pages.

TASK CONSOLIDATION, INFORMATION MANAGEMENT SYSTEM DEVELOPMENT AND IMPLEMENTATION AND THE ESTABLISHMENT OF A PROFESSIONAL FACILITIES MAINTENANCE TEAM ABOARD SHIP.

a. Team Concept

The basic idea in this area is that all facilities maintenance tasks can be consolidated and made the primary responsibility of a qualified team, made up from personnel currently assigned to the Deck Division. This team would work with improved equipment and materials and procedures and would receive appropriate training.

For years the hotel industry in the United States has adopted a similar approach. More recently, other industries have followed along. Until 1967, Texas Instruments contracted for its cleaning and janitorial services, but the firm's engineers evaluated the plant as only "65 percent clean." Apparently, the contractor's ability to do the job well was aggravated by a quarterly turnover rate of 100 percent. After careful planning and training, the following actions were taken in a test involving 120 maintenance personnel:

- Cleaning service teams of 19 people were organized and given a voice in the planning, problem solving, and goal setting for their own jobs.
- They were thoroughly trained in the job requirements and techniques, and provided with adequate equipment to do the job.
- They were held accountable for the overall job. The means of getting the job done was left to them. It was also the teams' responsibility to act independently to devise its own strategies, plans, and schedules to meet the objective.
- They were taught how to measure their own performance and given the freedom to do so, both as individuals and as teams.

The results were as follows:

- The cleanliness level rating increased from 65 percent to 85 percent.
- Personnel required for cleaning dropped from 120 to 71.
- Quarterly turnover dropped from 100 percent to 9.8 percent.
- From the fourth quarter of 1967 until the fourth quarter of 1969, costs savings for the entire site averaged $103,000 per annum.

The British Navy has recently introduced the concept of organized facilities maintenance and specialized facilities maintenance training for the junior ratings aboard ship. This is one of the concepts which will be explored in this study.

Instead of assigning major facilities maintenance to the various divisions (see Table 1), one team will be responsible for most facilities maintenance for the entire ship. Some members of the team will perform the tasks, while others will perform inspections, offer supervision, and provide advisory assistance where required. Exceptions to this will be performing facilities maintenance in specially designated security areas, engineering spaces, tactical operations areas at specified times, and minor housekeeping in enlisted quarters. Reorganization of facilities maintenance of personnel comprises the first concept in this area. Identification of specific billet assignments, and designations of facilities maintenance responsibilities and collateral functions will be performed during working sessions among the cognizant shipboard personnel and the study program staff.

The approach used in this reorganization effort consists of the following steps:

- Using the results of a survey of shipboard spaces and their facilities maintenance requirements, task/space configurations have been established for a selected set of spaces (see section on information managment). Practical constraints prevent all shipboard spaces from being considered in this study at present. The current plan is to consider all facilities maintenance for all berthing spaces, passageways, heads and showers, crew lounge, mess decks, exterior deck and ship sides, and all office spaces; and limited facilities maintenance (primarily major periodic maintenance such as carpet cleaning) in other spaces (e.g., wardroom).

- Estimates of the weekly manhours required for each task/space configuration and division responsibilities for these were established.

- The manning analysis charts in the Ship Manning Document for DE 1052 will be examined and the task/space units will be allocated in accordance with the guidelines discussed below.

There will be a permanent facilities maintenance team comprising members of the Deck Division who report technically and administratively to the Boatswains Mate Chief or his designated agent. An attempt will be made to minimize the watchstanding load, both at sea and in port, for this team. As part of the permanent facilities maintenance team, there will be a specialist paint team consisting of personnel trained in all aspects of painting and inspection of painting*. These personnel will receive their training at a shipyard facility and will be responsible for performing or supervising all painting aboard ship. Divisions responsible for certain spaces may request inspections and painting in those spaces by means of the Defect Job Card (Figure 1). They will then be told what surface preparation must occur and when and the Division that will be responsible for preparation. The job will then by scheduled by the Deck Division work center supervisor in charge of the paint team.

The permanent facilities maintenance team will perform major facilities maintenance in all passageways, heads, mess decks, office spaces, and berthing areas. They will also perform sanitization and exterior deck and sides cleaning. Galley and scullery maintenance will continue to be performed by the mess cooks.

The wardroom and officers quarters and associated areas, referred to as "officers country", will continue to be maintained by the stewards currently assigned with the exception of periodic complex tasks such as carpet cleaning using the Dupont Dri-Lux system. The stewards will also receive the benefits of the specially built training program and technical

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*The paint team may not be established at the beginning of this study.

Defect Job Card

Identification Section

Location of Defect: _____
Level Compartment Space Frame

Date of this report: _____ Person making report: _____

Description of Defect: _____

Action/Requirements Section

Date Received: _____ Work Center Spvr: _____

Personnel Assigned: _____

Date Required: _____ Manhours Required: _____

Equipment/Materials Requirements: _____

Repair/Renewal Actions required: _____

Date Completed: _____ Manhours spent _____

Deferral Reasons: _____

_____ New Schedule Date: _____

Inspected: Inspector: Results: Date:

data package. They will have access to facilities maintenance equipment/materials furnished under this program, provided they have received the appropriate training.

Watchstanders will continue to be required to perform minor facilities maintenance in their spaces (bridge, CIC, etc.). The permanent team will handle the major tasks in those areas when practicable. Similarly, spaces assigned to other departments (e.g., engineering berthing compartments) will receive minor facilities maintenance by persons in those departments. Personnel not assigned to the facilities maintenance team may request and receive advice, training, and materials from the Deck Division work center supervisor.

Figure 1. Format for Defect Job Card.

Once the size of the team has been estimated and task/space responsibilities have been drafted (responsibilities and FM manhours assigned to the various divisions), the reorganization scheme will be reviewed jointly by representatives of NSRDC, NPRDC, COMCRUDESGRUTWO, and the staff of USS TRIPPE. The scheme will be modified according to practical demands and will be implemented for the testing period.

b. Information Management System

A second concept in this area involves the employment of an information management system which will permit systematic job assignment and scheduling. An initial structure for such a system has been developed. The system will undergo refinement and further development prior to installation aboard ship for demonstration testing.

The basic information in the system will include:

- Functional categorization of facilities maintenance. Table 2 presents a configuration of facilities maintenance tasks.

- For each of the categories of tasks depicted in Table 2, a frequency of performance should be stated. A preliminary estimate of these frequencies is presented in Table 3. Frequencies for this test will be established in October 1975 with cooperation of COMCRUDESGRUTWO and ship's force.

- Tasks and frequencies should be related to the specific compartments aboard the ship. Table 4 presents shipboard compartment locations of concern aboard USS TRIPPE.

- Equipment and materials used for facilities maintenance tasks should be identified and related to the previous information categories. Table 5 presents a list of current facilities maintenance equipment and materials.

- The information categories (Tables 2 through 5 above) can be combined to form a catalog of jobs and job requirements (similar in concept to current Planned Maintenance System Maintenance Index Pages).

Requirements for a shipboard space survey have been initiated at NSRDC/A and forwarded to COMCRUDESGRUTWO/DESDEVGRU who agreed to perform a survey of shipboard spaces. This survey, which yielded data on size of spaces, types of surfaces, and facilities maintenance responsibility, was completed in September 1974.

Information from the survey is being used to organize the facilities maintenance task sets and responsibilities which will be incorporated into the information management system.

Additionally, representatives of NSRDC/A, NPRDC, and COMCRUDESGRUTWO/DESDEVGRU, and the staff of USS TRIPPE will meet to formulate a specific manning plan to accomplish the facilities maintenance tasks.

Stowage and distribution centers for facilities maintenance equipment and materials will be designed and personnel assigned to distribute the gear. It is estimated that the inventory control/distribution function will require a full-time person during the normal work day.

The information management system for facilities maintenance aboard USS TRIPPE will be similar in concept to the current Planned Maintenance System (PMS) schedule and to the Royal Navy's system for ship husbandry information management. It is expected that the management tools shown here will be refined and procedures for their use will be developed in conjunction with the staff and force of USS TRIPPE prior to study implementation.

TABLE 2. FUNCTIONAL CATEGORIZATION OF FACILITIES MAINTENANCE

CATEGORY	FUNCTIONAL BREAKDOWN
Surface preparation and painting	Exterior overhead and bulkhead painting:
	Cleaning surface
	Priming
	Painting
	Chipping (hammer and scraper) (every 4th time)
	Interior deck painting:
	Chipping (hammer and scraper)
	Buffing and masking
	Priming
	Painting (spray, roller, or brush)
	Exterior painting:
	Chipping
	Buffing and masking
	Priming
	Painting (spray, roller, or brush)
Head Cleaning	Drawing and stowing gear
	Dumping trash
	Cleaning urinal
	Polishing supply and drain line
	Scrubbing and swabbing deck
	Cleaning mirrors
	Cleaning commode
	Cleaning shower stalls
	Cleaning and polishing wash basin
	Wiping overhead
	Scrubbing bulkhead
	Cleaning shower curtains
Compartment and passageway cleaning	Damp mopping and buffing deck
	Scrubbing, swabbing, and waxing deck
	Dumping ash trays and trash
	Sweeping down ladders and decks
	Cleaning scuttle butts
	Vacuuming and wiping overhead
	Scrubbing bulkheads
	Cleaning and replacing bulbs/lights fixtures
	Dusting and wiping lockers
	Changing ventilation fixtures
	Drawing and stowing gear, policing area, etc.
Exterior cleaning	Sweeping deck
	Scrubbing and swabbing deck
	Scrubbing bulkheads
	Polishing brightwork
	Cleaning sides and stacks
	Cleaning boats

TABLE 2. (Continued)

CATEGORY	FUNCTIONAL BREAKDOWN
Miscellaneous FM	Replacing worn and broken tile Resealing terrazzo decks Applying "non-skid" to decks Laying carpeting Cosmetic repair (e.g., paint touch-up) Decorative FM (e.g., rope and canvas work) Dumping/incinerating ship's trash Maintaining coffee messes (e.g., emptying grounds) Cleaning crew's mess and galley Changing linen, making bunks, delivering laundry, cleaning furniture. Vent Cleaning Bilge cleaning Air conditioning cleaning

TABLE 3. SHIPBOARD FACILITIES MAINTENANCE TASK FREQUENCY

FM TASKS	FREQUENCY
Painting:	
Exterior	1/year
Interior (working/living – "piecemeal"	1/18 months
Interior (other)	As required
Touch-up	As required
Head cleaning:	
Clean sinks/mirrors	1/day
Clean toilets	1/day
Clean urinals	1/day
Clean showers	1/day
Empty receptacles	1/day
Swab deck	3/week
Dust/wipe bulkheads and ovhd. (scrubbing)	1/week
Seal terrazzo	1/month
Passageways and ladders:	
Sweep passageways and ladders	1/day
Wax tile deck	1/B weekly
Dust/wipe bulkheads and ovhd. (scrubbing)	1/B weekly
Clean light fixtures	1/month
Wirebrush ladders	1/month
Clean and Wipe scuttlebutts	1/week
Buff deck/swab deck	3/week
Operational spaces (e.g., CIC):	
Empty ashtrays/receptacles and police area*	3/day
Sweep area*	1/day
Vacuum area	2/week
Swab area/general cleaning	As required
Working spaces (e.g., shops/office spaces):	
Empty ash trays/receptacles and police area	1/day
Sweep area	1/day
Wax tile deck	1/month
Swab deck	2/week
Dust/wipe bulkheads and ovhd. (Scrubbing)	1/month
Crew living compartments:	
Sweep and police area/empty receptacles	1/day
Wax tile deck	1/B weekly
Buff deck	3/week
Dust/wipe bulkheads and ovhd. (scrubbing)	1/month
Swab deck	3/week
Dust and polish lockers	1/week

*Done by Watch Personnel

TABLE 3. (Continued)

FM TASKS	FREQUENCY
Mess decks:	
Sweep and police area/empty receptacles	3/day
Swab/buff deck	1/day
Wax tile deck	1/week
Dust/wipe bulkheads and ovhd. (scrubbing)	1/B weekly
Seal terrazzo areas	1/month
Food service equipment cleaning	1/day
Officer staterooms:	
Sweep and police arca/empty receptacles	1/day
Vacuum rugs (where installed)	1/day
Make bunks	1/day
Change linen	1/week
Swab and buff deck	1/week
Wax tile deck	1/B weekly
Clean sinks/mirrors	1/day
External**:	
Sweeping and swabbing deck	1/week
Scrubbing bulkhead	1/month
Polishing fittings	1/week

**At-sea frequencies only; subject to variation.

TABLE 4. FACILITIES MAINTENANCE AREAS ABOARD USS TRIPPE

MAINTENANCE AREA			FACILITY	
01 Level (Facilities Maintenance)				
1.	01-117- 2-L	Passage	–	
2.	01-101- 0-Q	Fan Room	–	
3.	01- 83- 2-Q	Fan Room	–	
4.	01- 54- 2-L	Passage	–	
5.	01- 54- 4-L	Bridge Urinal	–	
6.	01- 51- 0-L	Lobby	–	
7.	01- 83- 1-Q	Fan Room	–	
01 Level (Stewards)				
1.	01- 89- 0-L	Stateroom (2)	–	
2.	01- 85- 2-L	Stateroom (2)	–	
3.	01- 84- 0-A	Misc. Stow	–	
4.	01- 78- 2-L	WR & WC	Lav	1
			WC	1
5.	01- 70- 0-L	Passage	–	
6.	01- 51- 4-L	Unit CDR Bath	Shower	1
			Sink	1
			WC	1
7.	01- 51- 2-A	Unit CDR Strim	–	
8.	01- 46- 2-L	Unit CDR SR (1)	–	
9.	01- 46- 1-L	Capt. SR (1)	–	
10.	01- 51- 3-L	Capt. Bath	Shower	1
			Sink	1
			WC	1
11.	01- 51- 1-A	Capt. Strm	–	
12.	01- 70- 0-L	Passage	–	
13.	01- 84- 1-A	Officers' Luggage LKR	–	
14.	01- 85- 0-L	Passage	–	
15.	01- 85- 1-L	Passage	–	
16.	01- 88- 1-L	Offr. WR, WC, & SH	Shower	1
			LAV	1
			WC	1
			Urinal	1
Main Deck (Facilities Maintenance)				
1.	1-141- 2-L	Passage	–	
2.	1-139- 2-L	Passage	–	
3.	1-128- 0-Q	Fan Room	–	
4.	1-121- 0-L	Passage	–	
5.	1-107- 4	Unassigned	–	
6.	1-105- 2-L	Passage	–	
7.	1-107- 2-L	Passage	–	
8.	1- 95- 4-L	Passage	–	
9.	1- 87- 2	Unassigned	–	
10.	1- 83- 2-L	Passage	–	
11.	1- 75- 0-L	Passage	–	
12.	1- 59- 2-Q	Fan Room	–	
13.	1- 54- 2-L	Passage	–	
14.	1- 54-01-L	Passage	–	

TABLE 4. (Continued)

	MAINTENANCE AREA		FACILITY	
15.	1- 46- 2-L	Passage	–	
16.	1- 46- 1-L	Passage	–	
17.	1- 50- 1-L	Passage	–	
18.	1- 34- 1-Q	Fan Room	–	
19.	1- 54- 3-L	Passage	–	
20.	1- 54- 3-L	Passage	–	
21.	1-105- 3-L		–	
22.	1-125- 3-L	Passage	–	
23.	1-139- 1-L	Passage	–	
Main Deck (Stewards)				
1.	1-117- 2-4	WR Strm.	–	
2.	1-109- 0-L	Wardroom, Messroom & Lounge	–	
3.	1- 79- 1-L	Oper. Offr. SR. (2)	–	
4.	1- 86- 1-L	Supply Offr., Stateroom (2)	–	
5.	1- 95- 1-L	Engr. Offr. SR (2)	–	
6.	1- 95- 2-L	Comm. Offr. SR (2)	–	
7.	1- 95- 0-L	Passage	–	
8.	1-101- 2-L	Weapons Offr. SR (2)	–	
9.	1- 99- 1-L	Offr. WR WC	Shower	2
			CG LKR	1
			LAV	1
			WC	1
			Urinal	1
10.	1-103- 1-L	Exec. Offr. SR (1)	–	
11.		Exec. Offr. Bath	–	
12.	1-114- 0-Q	WR Galley	–	
Main Deck (Unassigned)				
1.	1-146- 2-A	Misc. Stow. Strm.	–	
2.	1-141- 4-A	Deck Gear LKR	–	
3.	1-135- 2-A	Helicopter Component Strm.	–	
4.	1-129- 2-Q	Post Office	–	
5.	1-123- 2-Q	Barber Shop	–	
6.	1-103- 2-Q	Potable Water Filling Sta.	–	
7.		Rainclothes LKR.	–	
8.		CG LKR	–	
9.	1- 61- 2-Q	Electronic Coolg. Equipment Room	–	
10.	1-105- 1-Q	Potable Water Filling Sta.	–	
11.	1-123- 3-A	Misc. Stow Strm.	–	
12.	1-123- 1-A	Paint Mix & Issue Rm.	–	
13.	1-133- 0-A	Bosns & Diving	–	
2nd Deck (Facilities Maintenance)				
1.	2-158- 0-E	VDS Machinery Rm.	–	
2.	2-147- 0-M	Torpedo Rm. #2 Minus 1st Class Lounge	–	
3.		1st Class Lounge	–	
4.	2-132-01-L	Pass & Aft Dressing Sta.	–	
5.	2-132- 0-2	Crew WR SHR & Fresh & Sea Water Decontn Sta. No. 2	Shower	3
			LAV	4
			Urinal	1

TABLE 4. (Continued)

MAINTENANCE AREA			FACILITY	
2nd Deck (Facilities Maintenance) (Continued)				
6.	2- 32- 1-L	CPO WR WC SHR SPC & Decontn Sta.	Shower	2
			LAV	4
			Urinal	1
			Shower	2
			LAV	3
			WC	2
			Urinal	1
7.	2-127- 0-L	CPO Living Space	Berths	15
			CG LKR	1
			Type D LKRS	2
			Type A LKRS	15
			Type G LKRS	1
			Type E LKRS	1
8.	2-128- 2-L	Crew WR & WC	WC	4
			LAV	2
			Urinal	2
9.	2-121- 0-L	Passage	–	
10.	2- 95-01-L	Passage	–	
11.	2- 79- 2-L	Passage	–	
12.	2- 67- 4-L	Passage	–	
13.	2- 64- 2-Q	Uper Dept. Office	–	
14.	2- 61- 2-Q	Unit CDR. Office	–	
15.	2- 61- 4-Q	WPNS Dept. Office	–	
16.	2- 54- 0-Q	Eng. Dept. Office, Damage Control Central	–	
17.	2- 54-01-L	Passage	–	
18.	2- 45- 2-L	Passage	–	
19.	2- 41- 2-Q	Fan Room	–	
20.	2- 47- 0-L	Crew WR, WC & SHR & FW	Shower	5
		& SW Decontan Sta. No. 1	LAV	10
			WC	7
			Urinal	4
21.	2- 41- 0-L	Crew Recreation Rm & RNO Bat Dressing Sta.		
22.	2- 29- 0-L	Crew Living Spc (60)	Berths	60
			Peacoat LKR	2
			Lkrs Type B-1	2
			Lkrs Type B-2	7
23.	2- 24- 0-L	Crew Living Spc (18)	Berths	18
			CG Lkrs	1
			Peacoat LKRS	3
			Lkrs Type B-2	3
24.	2- 16- 2-L	Passage	–	
25.	2- 5- 0-E	Windlass RM	–	
26.	2- 44- 1-L	Passage	–	
27.	2- 54- 1-Q	Executive Office	–	
28.	2- 61- 0-Q	Maintenance Control Center	–	
29.	2- 61- 3-Q	Supply Dept. Office	–	
30.	2- 67- 1-L	Passage	–	
31.	2- 47- 2-L	Passage	–	
32.	2- 79- 1-L	Passage	–	

TABLE 4. (Continued)

MAINTENANCE AREA			FACILITY	
2nd Deck (Unassigned)				
1.		Laundry	–	
2.	2-136- 1-A	Laundry Strm	–	
3.	2-121-01-L	CPO Mess RM & Lounge	Mess Cap	8
4.	2-132- 2-Q	Filter Cleaning Rm.	–	
5.	2-121- 2-Q	Scullery	–	
6.	5-121- 2-T	Package Conveyor Trunk	–	
7.	2-107- 1-Q	Crew & CPO Galley	–	
8.	2-107- 0-L	Crew Mess Rm	–	
9.	2- 61- 1-Q	Reg. Pub Office	–	
1st Platform (Facilities Maintenance)				
1.	3-155- 2-L	Passage	–	
2.	5-147-01-L	Passage	–	
3.	5-147-01-L	Passage	–	
4.	3-155- 1-L	Passage	–	
5.	3-132- 2-L	Passage	–	
6.	3-132- 0-L	Passage	–	
7.	3-132- 1	Unassigned	–	
8.	3-135- 1-Q	Fan Room	–	
9.	3-121- 0-L	Crew Living Space	Berth	69
			CG Lkr	1
			Lkr B-1	1
			Lkr B-2	10
			Peacoat Lkr	3
10.	3-110- 2-L	Passage	–	
11.	3- 59- 2-L	Crew Living Space	Berth	18
			Lkr B-1	2
			Peacoat Lkr	1
12.	3- 54- 2-L	Passage	–	
13.	3- 45- 0-L	Crew Living Space	Berth	48
			CG Lkr	1
			Lkr B-2	8
			Peacoat Lkr	2
14.	3- 37- 0-L	Passage	–	
15.	3- 29- 2-Q	Fan Room	–	
16.	3- 37- 1-Q	Fan Room	–	
1st Platform (Stewards)				
1.	5-135- 2-A	WR Strm.	–	
1st Platform (Unassigned)				
1.	5-147- 2-A	Trunk Rm.	–	
2.	5-155- 5-A	Misc. Strm	–	
3.	5-147- 1-A	SPL Clothing Strm	–	
4.	3-118- 2-A	Motion Picture Equlp. Strm.	–	
2nd Platform (Facilities Maintenance)				
1.	5-155- 6-A	Crew & CPO Bag Rm	–	
2.	5-147-01-L	Passage	–	
2nd Platform (Stewards)				
1.	5-153- 2-A	WR Strm	–	

TABLE 5. EQUIPMENT AND MATERIALS CURRENTLY USED IN SHIPBOARD FACILITIES MAINTENANCE

TASK	EQUIPMENT AND MATERIALS
Housekeeping	Manual tools and materials: Broom Mop Wire brush Dusting rags/dusters Sponges Pail Steel wool Scrub brush Cleaning "rags" Wax applicator/sponge mop Wax Scouring powder/standard soap Brasso Liquid industrial cleaner Toilet brush Mop wringer "Squeegee" (long handle and hand-held) Power tools: Vacuum cleaner Industrial-type vacuum cleaner (high suction/water) Buffer/sander
Painting	Manual tools and materials: Scraper Sandpaper and sanding blocks Chipping hammer Paint remover Paint thinner/paint cleaners Wire brush Masking tape and materials Stencils Hand paint mixer (sticks) Various paint brushes Rollers (paint) Various paints (interior/exterior) Special paints (e.g., aluminum) and varnishes/stains Primers and putty/caulking compound Special coatings (non-skid; mastic) Brush cleaners (e.g., turpentine); soap and water Painting tarpaulins/covers Bosun's chairs/painting platforms Power tools: Paint sprayers and associated respirator equipment Deck scaling machines (vaniors types) Pneumatic chipping hammers Disk sanders Pneumatic grinders Sand-blasting equipment (not normally found aboard ship) Blow torches Electric "burning off" tool

As stated earlier, the results of the shipboard space survey provided information on size of spaces, types of surfaces, etc. These data are being used to design a complete set of specific facilities maintenance tasks. The tasks will be specific to spaces, but may include aggregates of spaces (e.g., strip, wax, and buff all port passageways on the 01 level, monthly).

For each task, the following information will be preprinted on the Job Information Card (JIC):

1. Task frequency and JIC serial no. – all task/space configurations will be serialized and assigned a number for quick reference.

2. A general description of the qualitative nature of the task, (e.g., pressure wash down).

3. A description of the surfaces, equipment, and features which are in the space or spaces.

4. A list of equipment and materials (quantity and type) required for the taks.

5. A statement as to safety precautions and special hazards associated with the task.

6. A step-by-step description of the task (e.g., sweep to remove loose dirt using corn broom and dust pan, etc.).

7. References to applicable training program modules and other technical information sources.

8. Special remarks concerning the space or task (e.g., special reporting procedures for damaged surfaces, etc.)

Multiple copies of each job card will be produced (and color coded if possible) for distribution to facilities maintenance personnel prior to task performance.

The work center supervisor, after scheduling the daily tasks, will assign the tasks to specific individuals and enter the date and the assignee's name on the JIC. The facilities maintenance personnel will, upon completion of the task, enter the lapsed task time and number of manhours expended. In the space provided on the back of the card, they will record anomalies such as "3 lifted tiles," etc. The card will then be returned to a central collection point and the weekly schedule or quarterly schedule (to be described) will be updated.

The cards will be pocket-size and will be sufficiently sturdy to avert ripping or crumpling.

The work center supervisor will retain the complete set of unused cards in his file system and select the appropriate cards during the assignment process. A partial set of FMJICs has been developed. Figure 2 illustrates the JICs to be used for the following tasks:

- Clean/disinfect
- Strip and wax
- Shampoo
- Vacuum overhead
- Sweep, swab

Facilities Maintenance Job Information Card (FMJIC)

Frequency: FMJIC Ser: Daily	List of Spaces to be Maintained (1) 2-132-0-2	(5)
Task Clean/disinfect	(2) 2-32-1-L	(6)
Surface/Equip Type: Head	(3)	(7)
	(4)	(8)

Stores and Tools/Equipment: Hand soap, toilet tissue, detergent sanitizer, glass/metal cleaner, descaler, plastic waste bags, spray bottle, swab outfit & swab (see reverse side for more)

Safety Precautions: Avoid skin/eye contact with chemicals, espec. descaler. Do not direct spray at electrical outlet.
Avoid cluttering area with equipment. Use metal container for butts.

Job Method: (1) Pick up/sweep trash and dry soil from entire deck area. (2) Dump Butkits. (3) Remove/replace trash bags as req. (4) Clean trash receptacles. (5) Damp dust overhead (use deter/san if heavily soiled). (6) Clean lav area. (7) Clean all fixtures (basins, pipes). (8) Dry stainless sfc. (9) Clean mirrors, showers (scrub showers), urinals, and all other fixtures, commodes. (10) Restock supplies. (11) Clean deck. (12) Descale as req.

NO. Men Req: 1	Est. M/Hrs: 1.5	Personnel Assigned:
Date:	Actual Job Time: From:	To:

References: Training Module # 4 – Cleaning the Head and showers

Special Information: Clean and stow gear after job done. Report rust damage and other damage to supervisor. Close off head completely, if possible, while cleaning

Remarks by Personnel Assigned:

Figure 2. Sample of Job Information Card:
Clean/disinfect Task

Facilities Maintenance Job Information Card (FMJIC)

Frequency: FMJIC Ser: Semi Annual	List of Spaces to be Maintained (1) 2-44-1-L (5)
Task: Strip and Wax	(2) 2-67-1-L (6)
Surface/Equip Type: Vinyl Asbestos	(3) 2-79-1-L (7) (4) 3-110-2-L (8)

Stores and Tools/Equipment: Wax stripper, floor finish, floor machine, stripping pads, wet vacuum with wet pan insert, broom, clean cloths, bucket (wr), 3 swabs, doodlebug, sign marker

Safety Precautions: Check electrical cord and plugs prior to use. Keep cord clear of machine path. Avoid skin/eye contact with stripper, Restrict traffic and avoid area clutter.

Job Method: (1) Sweep to remove trash and dry soil. (2) Wet or dry strip the deck. (3) Rinse thoroughly. (4) Let dry (clean equipment). (5) Apply finish, one coat at a time, and let dry, for a total of three coats. (6) Clean and stow gear.
*Make sure area is clear of furniture and avoid splashing bulkheads (immediately clean any splash with damp cloths)
**Restrict Traffic and allow 30 minutes for each coat to dry.

No. Men Req:	Est. M/Hrs:	Personnel Assigned:
1	3.75	

Date:	Actual Job Time: From:	To:

References: Training Module # 10 – Periodic Care of Resilient and Terrazzo Decks.

Special Information: Do not return unused finish to original container. Use double bucket method. Do not contaminate finish swab with stripper or rinse swab. Keep finish absolutely clean before applying. Avoid applying too much finish in a single coat.

Remarks by Personnel Assigned:

Figure 2. (Continued)

Facilities Maintenance Job Information Card (FMJIC)

Frequency: Bi-Monthly	FMJIC Ser:	List of Spaces to be Maintained	
		(1) 2-121-01-L	(5)
Task: Shampoo		(2) 2-147-1-L	(6)
Surface/Equip Type: Nomex Carpet		(3)	(7)
		(4)	(8)

Stores and Tools/Equipment: Advance upright vacuum cleaner, advance carpet shampooer, 3-M carpet stain remover, 3-M carpet shampoo, clean cloths, scrub brush.

Safety Precautions: Check electrical cords and plugs prior to using equipment. Keep cord clear of machine path. Secure area. Read Labels prior to using stain remover or shampoo. No eye contact

Job Method: (1) Move furniture out of the way. (2) Remove loose trash and vacuum area throughly, clean corners and edges with brush. (3) Treat obvious spots first with stain remover. (3) Fill tank of shampooer before entering area. (4) Restrict traffic and shampoo as directed in reference TM # 2. (5) Allow 30 min. to dry. (6) Vacuum area thoroughly. (7) Return furniture. (8) Clean and stow gear-do not stow shampooer until tank is clean and empty.

No. Men Req:	Est. M/Hrs:	Personnel Assigned:
1	1.5	

Date:	Actual Job Time: From: To:

References: TM # 2 – Routine and periodic Carpet Care Operating manuals for Advance Machines Labels on 3-M Products used.

Special Information: Damp clean shoes prior to shampooing or wear sneakers. Adjust height of brush on shampooer properly (see TM #) Report all carpet damage (chairs, holes fraying, etc.) to Supervisor.

Remarks by Personnel Assigned:

Figure 2. (Continued)

Facilities Maintenance Job Information Card (FMJIC)

Frequency: FMJIC Ser: Bi-Weekly	List of Spaces to be Maintained (1) 1-139-1-L	(5) 2-79-2-L
Task: Vacuum Overhead	(2) 2-132-01-L	(6) 2-67-4-L
Surface/Equip Type: Painted, w pipes	(3) 2-121-0-L	(7) 2-54-01-L
	(4) 2-95-01-L	(8) See reverse side

Stores and Tools/Equipment: Pullman industrial tank vacuum on casters without wet pan insert, with brush tools for overheads.		
Safety Precautions: Check electrical cord and plug prior to use		
Job Method: (1) Vacuum, getting into crevices and corners (2) Clean and stow gear, empty vac bag/ filter if over 2/3 full.		
No. Men Req: 1	Est. M/Hrs: 3.0	Personnel Assigned:
Date:	Actual Job Time: From:	To:
References: Training Module # 11 Routine and Periodic Care of Bulkheads and overheads. Tech manual for Pullman Vac		
Special Information: Report signs of corrosion, broken, lagging or damaged/wet surfaces.		
Remarks by Personnel Assigned:		

Figure 2. (Continued)

Facilities Maintenance Job Information Card (FMJIC)

Frequency: FMJIC Ser: Daily	List of Spaces to be Maintained: (1) 1-54-3-L (5) 3-147-01-L
Task: Sweep, swab	(2) 1-125-3-L (6) 3-155-1-L
Surface/Equip Type: Painted Steel	(3) 1-139-1-L (7) 3-132-2-L
	(4) 3-155-2-L (8) (See Reverse side)
Stores and Tools/Equipment: Straw broom, janitorial dustpan clean coths, swab, bucket w/wringer, scrub brush, GP detergent, detergent-sanitizer	
Safety Precautions: Restrict traffic	
Job Method: (1) Sweep area thoroughly especially corners. Raise as little dust as possible. Sweep ladders (2) Gather sweepings in dustpan (3) Swab deck thoroughly (4) Damp wipe ladders (5) Clean scuttlebutts (6) Clean and stow gear	

No. Men Req:	Est. M/Hrs:	Personnel Assigned:
1	4.5	

Date:	Actual Job Time: From: To:
References: (Training Module # 3 – Cleaning passageways, ladders and related areas	
Special Information: Report damaged surfaces to supervisor.	
Remarks by Personnel Assigned:	

Figure 2. (Continued)

In addition to the Job Information Card, a Defect Job Card (Figure 1) will be used to bring unscheduled items into the system. The following list represents some of the defects that should be handled with the Defect Job Card:

- Carpet repair requirements –
  - plugging
  - replacing entire sections
- Cracked terrazzo
- Lifted or broken vinyl asbestos tile
- Blistering, cracked, painted surfaces
- Rust
- Worn lacquer
- Signs of vermin (rats, cockroaches, etc.)

The Defect Job Card can be introduced by personnel conducting inspections, officers or ratings responsible for cleanliness and appearance of spaces, and/or senior members of the FM teams.

The completed and returned Job Information Cards should be examined by the work center supervisor to note special remarks pointing to the need for a Defect Job Card.

A weekly status board (or pad) will be maintained by the work center supervisor. He will use the board in scheduling and assigning all of the FM tasks, using the same codes to identify the task that appear on the JIC. He will insert the names of the individuals assigned, indicate the task and day which it is to occur, and insert a code in the adjacent cell to indicate whether job is completed, delayed, or cancelled. Figure 3 shows a draft format for the Weekly FM Schedule.

The supervisor will also have, as an assignment aid, a roster status board of personnel assigned to him showing their daily workload. This will allow him to distribute the work evenly and avoid conflicting assignments (see Figure 4).

The Division Officer will be given a file of quarterly, monthly, and weekly FM requirements as an aid, and the work center supervisor will use the schedule for FM in a manner identical to that for Planned Maintenance (PM). (Supervisor periodically checks the quarterly board to make up the weekly schedule and daily assignments and updates the weekly and quarterly boards.)

Once the FM JIC's have been constructed and the quarterly requirements have been specified, a manning plan will be constructed jointly by representation of the ship's staff, COMCRUDESGRUTWO/DESDEVGRU, NSRDC/A and NPRDC. The manning resources "required" and "available" must first be determined.

c. Technical Data

A third concept in this area is the development and use of facilities maintenance technical data which cover the following subject areas:

- Systematic presentation of all shipboard facilities maintenance tasks, their locations, materials and equipment needed, skills required, organizational responsibilities, and periodicity. These content areas will be alphabetically arranged and cross-indexed.

WEEKLY FM SCHEDULE

WORK CENTER	FM SCHEDULE FOR WEEK OF:					APPROVAL SIGNATURE	
JIC SERIAL	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SAT/SUN	

Figure 3. Draft format of Weekly FM Schedule.

PERSONNEL ROSTER

Insert JIC # at appropriate time of day for each man or insert other task code, e.g. W = Watch

NAME	DATE	TIME OF DAY											
		0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800

Figure 4. Draft format of Personnel Roster.

- Detailed procedural descriptions of each facilities maintenance task, e.g., step-by-step procedures for stripping and waxing vinyl asbestos tile decks.
- Facilities maintenance materials and equipment, technical characteristics, operations and maintenance requirements, and precautionary guidelines.
- List of applicable training program materials and references.
- Inspection schedules, standards and criteria.

The technical data are currently under development at NSRDC and could comprise the basis for a technical manual.

2. INTRODUCTION INTO THE FLEET OF IMPROVED FACILITIES MAINTENANCE EQUIPMENT, PROCEDURES AND MATERIALS, AND IMPROVEMENTS TO SHIPBOARD MAINTENANCE ENVIRONMENT

The previous concept area dealt with manpower and personnel factors such as organization, task definition, and scheduling. This concept area is concerned with physical factors such as equipment, chemical compounds, surfaces and coatings.

Existing facilities maintenance equipment, procedures, and materials are currently being examined to determine if additions or modifications could lead to manpower savings. Innovations from industry are being continually explored and evaluated as candidates for inclusion in this study program.

All equipment and materials described below will be installed on board USS TRIPPE while it is located at the Charleston Naval Base, S.C. in October 1974. Coordination of the effort will be performed by COMCRUDESGRUTWO/DESDEVGRU with the cooperation of the contractors involved, the staff and crew of USS TRIPPE, NSRDC/A staff, and NPRDC staff.

HYDRO-TECH PRESSURE WASHER SYSTEM

Two Hydro-Tech Pressure Washer systems have been purchased (Contract N00024-74-C-1249). The systems, which deliver about 1800 p.s.i. of liquid, will be used aboard ship during the study period for main deck wash down, bilge cleaning, and surface cleansing. The pump systems will be permanently installed in locations mutually agreed upon by the ship's staff and the contractor. The systems are currently in the NSRDC/A receiving warehouse awaiting shipment to the Charleston, S.C. Naval Base. The contractor will install the systems and provide training/orientation to users/operators aboard ship.

VON SCHRADER CORPORATION WALL DETERGER

One Von Schrader wall deterger plus accessories and wall detergent has been received on a loan-and-return basis. The equipment and detergent have been shipped to Charleston Naval Base, S.C., and are in the custody of COMCRUDESGRUTWO/DESDEVGRU awaiting transfer to USS TRIPPE. Instructions for use and maintenance accompany the system. The equipment is portable and designed to cleanse bulkhead surfaces. No permanent installation is required.

PULLMAN CORPORATION TANK VACUUM CLEANERS

Two Pullman Tank Vacuum Cleaners (wet/dry) have been purchased through GSA (NSRDC/A Job Order 1-2792-107-60/2792) and have been shipped to Charleston Naval Base, S.C. The units are complete with instructions and accessories and are in the custody of COMCRUDESGRUTWO/DESDEVGRU and await transfer to the ship. The equipment is portable and designed for heavy dury wet or dry vacuuming. No permanent installation is required. A description of the units can be found in the GSA Supply Catalog of October 1973, page 274, item number 6 (7910-267-1207).

ADVANCED MACHINE COMPANY UPRIGHT VACUUM CLEANERS

Two Advance Upright Vacuum Cleaners have been purchased through GSA (NSRDC/A Job Order 1-2792-107-60/2792) and have been shipped to Charleston Naval Base, S.C. The units are complete with instructions and accessories and are in the custody of COMCRUDESGRUTWO/DESDEVGRU and await transfer to USS TRIPPE. The equipment is portable and designed for dry vacuuming, especially of carpets. No permanent installation is required. A description of the units can be found in the GSA Supply Catalog of October 1973, page 274, item number 6 (7910-468-4197).

E. T. BARWICK COMPANY NOMEX CARPET

Six hundred yards of E.T. Barwick Company NOMEX tufted carpeting have been purchased through GSA (NSRDC Job Order 1-2792-107-60/2792) for installation on USS TRIPPE. The ship's staff participated in the selection of colors and spaces for installation. The carpet has been delivered to Charleston Naval Base, custody of COMCRUDESGRUTWO/DESDEVGRU. It is further anticipated that installation will occur before 15 October. A separate contract for permanent installation will shortly be negotiated through COMCRUDESGRUTWO/DESDEVGRU with a local contractor. Before NOMEX carpeting can be installed, existing deck surfaces in the designated spaces must be scrapped to bare metal, primed with epoxy, and covered with acceptable adhesive.

DUPONT DRI-LUX CARPET CLEANING SYSTEM

The following equipment/materials have been received from the E. I. Dupont de Nemours Company, Inc.:

2 sprayers (S305 and S311)
1 spreader (F117)
1 Roto-Oscillator (CSM-2-117)
1 vacuum cleaner (VH123 Complete)
2 power heads with hosing (RM118 and RM101)
3 deck brushes
1 vacuum tank basket continaing 1 pint bottle spotter, 1 rag, 1 small brush, 1 vacuum brush tool, 1 large hand brush, 3 deck brushes, 20 50-gallon plastic bags
1 case (5 1-gal. units) all-purpose spotter
2 cases (6 ½-gal. units) pre-spray concentrate

500 lbs. soil extractor (20 25-lb. bags)
6 1½-gallon units of carpet protector concentrate
2 gallons Dupont shampoo

Collectively, these items comprise a carpet cleaning soil extraction system which has been successfully demonstrated on the wardroom carpet of USS TRIPPE. The package is in the custody of COMCRUDESGRUTWO/DESDEVGRU at Charleston Naval Base, S.C.

The system is quite bulky and is not intended for installation aboard ship. However, periodic use of the system is planned for in-port periods. Instructional materials are being forwarded by the Dupont Corporation. Additionally, the contractor will train shipboard personnel in the use of the system.

The package has been procured on a load-and-return basis. Use of the system is planned during formal evaluation.

ADVANCE MACHINE COMPANY CARPETRON 14 CARPET SHAMPOOER

An Advance Carpetron 14 Carpet Shampooer has been procured on a loan-and-return basis for use aboard USS TRIPPE during the study. The machine is currently in the custody of COMCRUDESGRUTWO/DESDEVGRU awaiting transfer to the ship. Its primary use will be for the new NOMEX carpeting. It is portable and does not require permanent installation.

OWATOONA TOOL COMPANY TRASH COMPACTOR

One Owatoona Trash Compactor is being procured for permanent installation aboard USS TRIPPE. The device is being obtained on a loan-and-return basis. It will shortly be shipped to Charleston Naval Base, S.C. to be placed in the custody of COMCRUDESGRUTWO/DESDEVGRU until installation. The installation will be made by the contractor with cooperation of the ship's crew. A location for the device has not yet been selected. Containers for the compacted trash (plastic bags) and deodorizer are being purchased. Instructional materials and some training in the operation and maintenance of the device will be furnished by the contractor.

SQUAR-BUFF FLOOR MACHINE

One Squar-Buff floor machine is being procured on a loan-and-return basis. It will be delivered to NSRDC/A, shipped down to Charleston Naval Base, S.C. to the custody of COMCRUDESGRUTWO/DESDEVGRU, and transferred to USS TRIPPE. The machine comes with instructional materials and accessories and is designed for stripping, waxing, and buffing of resilient and terrazzo decks. It is portable, requires no permanent installation, and will be used during test and evaluation along with the other innovations.

FUTURUS CARPET TILE

One thousand eighty (1080) square feet of Futurus Carpet tile has been purchased along with sealer, adhesive, and reducing strip under contract to Futurus, Inc. (Contract N0024-74-C-1250). The material will be installed in entrance ways as "walk-off" mats which

are designed to collect dirt and grime so that passageways and carpeted or tiled surfaces do not receive such heavy soiling. The material has been forwarded to Charleston Naval Base,S.C. and is in the custody of COMCRUDESGRUTWO/DESDEVGRU awaiting transfer to USS TRIPPE.

CLEANING SUPPLIES

In addition to items described above, the following items have been purchased and delivered to the custody of COMCRUDESGRUTWO/DESDEVGRU:

5 gallons Johnsons Co. "Complete" Floor finish – a metallized acrylic
1 pair of NEOPRENE gloves
1 trigger sprayer
1 12-in. dust mop
1 gallon sprayol dust compount
3 mop handles
3 24-oz. rayon wet mops heads
3 12-in. deck scrub brushes
1 warehouse corn broom
1 mop bucket, oval w. wringer
1 16-qt. bucket
1 Rubbermaid Caddy
1 12-in. sequeegec
1 janitorial style dustpan
1 3M doodlebug (for baseboard cleaning)
1 55-gal. drum of 3M soil retardant shampoo
1 case of heavy duty stain remover
1 husky spray unit attachment for floor machine – spray buffing
1 case spray cleaner
1 case Dri-strip 303 – floor stripper
1 case 3M buffer pads
1 case 3M stripper pads
1 3M 14-in. insta-lok driving assembly for floor machine
1 3M clutch plate for floor machine
2 55-gal. drums of H.D. detergent
2 55-gal. drums of general-purpose detergent
4 5-gal. units of detergent sanitizer
1 can of lacquer for brightwork.
40 lacquer brushes
1 can of lacquer rubbing compound
25 toilet bowl swabs

These items will be transfered to USS TRIPPE during the week of 13 October and will be used during the test and evaluation. The 55-gallon drums of liquid will not be placed aboard ship. The liquids will be transferred to 5-gallon containers (cubitainers) and placed aboard ship as required.

All equipment/materials mentioned will be stored in a space(s) aboard ship designated as the cleaning gear locker, and a chit system will be used to control distribution of equipment/

materials aboard ship during the test period. Figure 5 shows a sample format for controlling the distribution of items.

3. THE DEVELOPMENT AND ADMINISTRATION OF A COMPREHENSIVE AT-SEA FACILITIES MAINTENANCE TRAINING PROGRAM, FOR USE BY BOTH THE TEAM OF SPECIALISTS AND OTHER SHIPBOARD PERSONNEL WITH FM DUTIES.

A contract (N00024-74-C-1268) has been awarded to the Lever Brothers Company for the development of a comprehensive audiovisual facilities maintenance training program. The program, currently under development, includes 35MM slides and magnetic tape recordings of scripts on 18 topic areas. The title of each module of the training program is as follows:

Module	Title
1	Why we clean
2	Routine and periodic carpet care
3	Cleaning passageways, ladders, and related areas
4	Cleaning the head and showers
5	Cleaning the galley and scullery
6	Routine care of resilient and terrazzo decks
7	Cleaning the mess decks
8	Cleaning office areas, meeting rooms, ward rooms, and battle dressing stations
9	Cleaning and bunk making in officers' quarters
10	Periodic care of resilient and terrazzo decks
11	Routine and periodic care of bulkheads and overheads
12	Cleaning the ship's ventilation system
13	Cleaning exterior deck areas
14	Cleaning crew living space
15	Use of sanitation and facilities maintenance chemicals
16	Care of facilities maintenance equipment
17	Safety in shipboard facilities maintenance operation
18	Bilge cleaning

GENERAL TEST METHODOLOGY

Following the screening of the specific concepts discussed above, all candidate concepts will be organized to form an integrated pilot demonstration package for installation and test aboard USS TRIPPE.

A short orientation period is desirable so that difficulties encountered in testing the concepts can be identified and resolved. Refinements and changes to the package and test methods are anticipated.

One key aspect of the testing program is that shipboard personnel are expected to participate in concept design, implementation and test. Ship personnel will be involved in:

- Administration and evaluation of training
- Data collection

PRIMARY FM EQUIPMENT DRAW LOG

ITEM/DESCRIPTION/SER. #	TIME OUT	TIME IN	DRAW BY
Date:		Gear Locker Attendant:	

Figure 5. Format to be used for controlling item destruction.

- Management (scheduling, assignment, inspection, record-keeping) of facilities maintenance task units
- Subjective evaluations concerning ship's appearance, work distribution, etc.
- Developing, and scheduling additional innovations for future test
- Modifying the planned pilot package for "final testing"

Data for manhour comparisons will be collected on USS TRIPPE prior to the installation of the package and on a "control" ship during the deployment testing period. Every attempt will be made to select a "control" ship which is as similar as possible to USS TRIPPE.

Once problems have been solved and refinements to the package and test methods have been made, formal deployment/testing will proceed. Data will then be analyzed and reported upon.

1. Hypotheses, Measures, and Data Taking Requirements

The major independent variable in this study is the integrated set of concepts implemented on board the DE 1052 following a pilot deployment. The concepts, as mentioned previously, fall into three categories: task consolidation and team establishment, equipment/materials improvements, and training. Practical constraints will not permit separate study of concept areas or concepts within each area. What is being evaluated in this study is basically the "old" system versus the "new proposed" system. An attempt will be made during data collection and analysis, however, to evaluate the separate features of the demonstration package. The main hypotheses of this demonstration study are:

a. Hypotheses # 1:

There will be fewer manhours spent on the required facilities maintenance tasks as a net result of the innovations in equipment, materials, managment, training, and environmental improvements.

The dependent measure for evaluating this hypothesis is the number of manhours expended to accomplish the facilities maintenance tasks for designated ship spaces.

The task taxonomy presented in Table 6 will be used to organize the data on manhours expended. In other words for every ship space studied in this program, a set of tasks from Table 6 (e.g., vacuum carpets, etc.) will be listed and the number of manhours spent doing each of the required tasks will be recorded. Data will be recorded on the form shown in Table 6 and aggregated for each week of the study. Data recording will begin prior to making any installation of equipment, materials, etc. This data will serve as premeasures and will be used as the basis for comparison against post-test measures (data recorded following the installations) Work sampling data will also be collected (see Figure 6).

It is important to state that for each of the tasks (aggregated for all spaces selected) the average weekly workload (manhours spent) will be computed for use in statistical tests of the hypotheses. These averages can then be aggregated into a grand average for all tasks for testing of the main hypotheses.

FACILITIES MAINTENANCE
PERFORMANCE DATA

SHIP NAME & NUMBER: _____ DATE: _____

SHIP LOCATION: _____ TIME: _____

SHIP STATUS: ☐ IN-PORT ☐ UNDERWAY OBSERVER: _____

DATA SET: _____

TASK ID (TASK/SPACE): _____

_____

DIVISION RESPONSIBILITY: _____ SUPERVISOR: _____

PERSONNEL ASSIGNED: _____

TASK TIME: FROM _____ TO _____ MAN HOURS: _____

PERFORMANCE RATING SCALE

EXCELLENT: NO MAINTENANCE NECESSARY — 1 — 2 — 3 — 4 — 5 — 6 — 7 — UNACCEPTABLE: HAZARD CONDITION, IMMEDIATE CORRECTIVE ACTION REQUIRED

SPACE RATED	RATING	TYPE STANDARD USED
OVERALL APPEARANCE:	_____	_____
BULKHEAD:	_____	_____
OVERHEAD:	_____	_____
DECK:	_____	_____

FIXTURES/EQUIPMENT RATED	RATING
_____	_____
_____	_____
_____	_____

COMMENTS (SPECIAL PROBLEMS): _____

_____

Figure 6. Format for collecting work sampling data.

In addition to pretest and posttest measures, data from other ships of the same class will be obtained for the same spaces and tasks and used in the statistical comparisons to show whether or not the innovations have led to a manhour reduction.

By organizing the detailed data as shown in Table 6, it will be possible to make inferences regarding subordinate hypotheses such as the reduction in manhour requirements associated with specific types of tasks in specific classes of spaces (e.g, care of resilient floors, terrazzo or exterior deck surfaces).

Since all of the innovations will be installed at one time, it will not be possible to statistically determine the relative contributions to manhours reductions due to specific devices, materials, training modules, or management. However, interviews with personnel doing the jobs should yield information on their specific benefits.

The results of the quantitative data collection will be tabularized for presentation and analysis.

Three methods will be used to obtain number of manhours during the post-installation period:

- Use of the form shown in Table 6
- Use of returned Job Information Cards (Figure 2) completed at the end of each task by individuals performing the tasks
- Work sampling using the upper part of the form shown in Figure 6.

To briefly summarize this discussion, the measure used for hypothesis testing here is manhours spent on facilities maintenance. Data on this measure will be collected and organized according to type of task and space and aggregated on a weekly basis to determine average number of hours per week per task. Comparisons, made both "before" and "after" installation, and USS TRIPPE vs. other ships, will be made for the grand mean of facilities maintenance manhours and for manhours for each class of task stated in Table 6. Simple parametric tests such as "t" tests may be used for the comparison. Additionally, personnel will be interviewed and evaluation forms (AppendixA) completed to determine if specific innovations are deemed contributions to a reduction in workload requirements.

b. Hypothesis # 2:

Appearance and cleanliness of spaces, i.e., specific aspects of spaces such as decks, overheads, etc., will be judged to determine whether they have improved as a result of the implementation of the innovative concepts previously discussed.

It should be clear at the outset of this discussion that the preponderance of measures to be used in evaluating this hypothesis is necessarily subjective. There are such measuring devices as glossmeters to determine objectively the amount of sheen, and bacteriological methods to check objectively the bacteriological hazards, etc. However, these are not deemed practical for use in this study.

Instead, measures to be used are (1) attitudes and opinions of personnel living and working in the spaces of concern and (2) opinions of supervisory personnel (Boatswain Mate Chief, First Lieutenant, Executive Officer, Commanding Officer) concerning the condition, cleanliness and appearance of the spaces. These opinions and attitudes will be reflected in quantitative statements made by the individuals on a scale of 1 through 7 (e.g.,are the decks in good shape, clean, etc). The scaled estimates will be made and data taken on them will be recorded weekly for each space of concern. Additionally, qualitative comments will be solicited and examined to provided additional information on the cleanliness and appearance

TABLE 6

Format for Collecting FM Manhours Data

Ship: _____ Date: _____ Observer: _____ At Sea: _____ In Port: _____

Space Designation	1. SWEEP DECK	2. SCRUB/SWAB DECK	3. DAMP SWAB DECK	4. REPLENISH WATER	5. VACUUM CARPETS	6 SHAMPOO CARPETS	7. WIPE DOWN BULKHEADS	8. SCRUB BULKHEADS	9. VACUUM/BRUSH OVERHEAD	10. WIPE DOWN OVERHEAD	11. CLEAN LIGHT FIXTURE	12. WIPE DOWN LOCKERS/ FURNITURE	13. CLEAN LOCKER(S)	14. SWEEP LADDER(S)	15. WIPE DOWN LADDERS	16. SCRUB LADDER(S)	17. WAX DECK	18. CLEAN FURNITURE

Instructions: Enter in each cell, i.e., for each task and space, the number of manhours spent on the task and the Division responsible. This is a two-part form.

Part: A Page 1 of 1

TABLE 6. (Continued)

Ship: _____ Date: _____ Observer: _____ At Sea: ____ In Port: ____

Space Designation	19. CLEAN MIRROR(S)/ WINDOWS	20. CLEAN SCUTTLEBUTT(S)	21. WIPE DOWN EQUIPMENT	22. CLEAN VENT SCREENS	23. DUMP TRASH	24. TITIVATE	25. CLEAN URINALS	26. CLEAN COMMODES	27. CLEAN WASHBASIN/ UTIL SINK	28. CLEAN SHOWER STALLS	29. CLEAN SHOWER CURTAINS	30. REPLN EXPEND SUPPLIES	31. PREPARE SURFACE	32. PAINTING	33. CLEAN FANS & VENTS			
01-117-2-L Passage																		
01-101-0-Q Fan Room																		
01- 83-2-Q Fan Room																		
01-54-2-L Passage																		
01-54-4-L Bridge Urinal																		
01-51-0-L Lobby																		
01-83-1-Q Fan Room																		
01-89-0-L Stateroom(2)																		
01-85-2-L Stateroom(2)																		
01-84-0-A Misc. Stow																		
01-78-2-L WR & WC																		
01-70-0-L Passage																		
01-51-4-L Unit CDR Bath																		
01-51-2-A Unit CDR Strn																		
01-46-2-L Unit CDR SR (1)																		

Part: B Page: 1 of 10

Instructions: Enter in each cell, i.e., for each task and space, the number of manhours spent on the task and the Division responsible. This is a two-part form.

TABLE 6. (Continued)

Ship: _____ Date: _____ Observer: _____ At Sea: ____ In Port: ____

Space Designation	19. CLEAN MIRROR(S)/ WINDOWS	20. CLEAN SCUTTLEBUTT(S)	21. WIPE DOWN EQUIPMENT	22. CLEAN VENT SCREENS	23. DUMP TRASH	24. TITIVATE	25. CLEAN URINALS	26. CLEAN COMMODES	27. CLEAN WASH/BASIN/ UTIL SINK	28. CLEAN SHOWER STALLS	29. CLEAN SHOWER CURTAINS	30. REPLN EXPEND. SUPPLIES	31. PREPARE SURFACE	32. PAINTING	33. CLEAN FANS & VENTS			
01-46-1-L Capt. SR (1)																		
01-51-3-L Capt. Bath																		
01-51-1-A Capt. Strm																		
01-70-0-L Passage																		
01-84-1-A Offcrs Lgge LKR																		
01-85-0-L Passage																		
01-85-1-L Passage																		
01-88-1-L Offr. WR, WC&SH																		
1-141-2-L Passage																		
1-139-2-L Passage																		
1-128-0-Q Fan Room																		
1-121-0-L Passage																		
1-107-4 Unassigned																		
1-105-2-L Passage																		
1-107-2-L Passage																		

Instructions: Enter in each cell, i.e., for each task and space, the number of manhours spent on the task and the Division responsible. This is a two-part form.

Part: B Page: 2 of 10

TABLE 6. (Continued)

Ship: _____ Date: _____ Observer: _____ At Sea: ____ In Port: ____

Space Designation	19. CLEAN MIRROR(S)/ WINDOWS	20. CLEAN SCUTTLEBUTT(S)	21. WIPE DOWN EQUIPMENT	22. CLEAN VENT SCREENS	23. DUMP TRASH	24. TITIVATE	25. CLEAN URINALS	26. CLEAN COMMODES	27. CLEAN WASHBASIN/ UTIL SINK	28. CLEAN SHOWER STALLS	29. CLEAN SHOWER CURTAINS	30. REPLN EXPEND. SUPPLIES	31. PREPARE SURFACE	32. PAINTING	33. CLEAN FANS & VENTS			
1-95-4-L Passage																		
1-87-2 Unassigned																		
1-83-2-L Passage																		
1-75-0-L Passage																		
1-59-2-Q Fan Room																		
1-54-2-L Passage																		
1-54-01-L Passage																		
1-46-2-L Passage																		
1-46-1-L Passage																		
1-50-1-L Passage																		
1-34-1-Q Fan Room																		
1-54-3-L Passage																		
1-105-3-L																		
1-125-3-L Passage																		
1-139-1-L Passage																		

Part: B Page: 3 of 10

Instructions: Enter in each cell, i.e., for each task and space, the number of manhours spent on the task and the Division responsible. This is a two-part form.

TABLE 6. (Continued)

Ship: _____ Date: _____ Observer: _____ At Sea: ____ In Port: ____

Space Designation	19. CLEAN MIRROR(S)/ WINDOWS	20. CLEAN SCUTTLEBUTT(S)	21. WIPE DOWN EQUIPMENT	22. CLEAN VENT SCREENS	23. DUMP TRASH	24. TITIVATE	25. CLEAN URINALS	26. CLEAN COMMODES	27. CLEAN WASHBASIN/ UTIL SINK	28. CLEAN SHOWER STALLS	29. CLEAN SHOWER CURTAINS	30. REPLN EXPEND. SUPPLIES	31. PREPARE SURFACE	32. PAINTING	33. CLEAN FANS & VENTS		
1-117- 2-4 WR Strm.																	
1-103- 0-L Wrdrm. Messrm & Lng																	
1- 79- 1-L Oper. Offr. SR(2)																	
1- 86- 1-L Sup. Offr. Strm. (2)																	
1- 95- 1-L Engr. Offr. SR (2)																	
1- 95- 2-L Comn. Offr. SR (2)																	
1- 95- 0-L Passage																	
1-101- 2-L Wpns Offr. SR (2)																	
1- 99- 1-L Offr. WR WC																	
1-103- 1-L Ex. Offr. SR (1)																	
Exec. Offr. Bath																	
1-114- 0-Q WR Galley																	
1-146- 2-A Misc. Stow. Strm.																	
1-141- 4-A Deck Gear LKR																	
1-135- 2-A Heli. Comp. Strm.																	

Part: B Page: 4 of 10

Instructions: Enter in each cell, i.e., for each task and space, the number of manhours spent on the task and the Division responsible. This is a two-part form.

TABLE 6. (Continued)

Ship: _____ Date: _____ Observer: _____ At Sea: ____ In Port: ____

Space Designation	19. CLEAN MIRROR(S)/ WINDOWS	20. CLEAN SCUTTLEBUTT(S)	21. WIPE DOWN EQUIPMENT	22. CLEAN VENT SCREENS	23. DUMP TRASH	24. TITIVATE	25. CLEAN URINALS	26. CLEAN COMMODES	27. CLEAN WASHBASIN/ UTIL SINK	28. CLEAN SHOWER STALLS	29. CLEAN SHOWER CURTAINS	30. REPLN EXPEND. SUPPLIES	31. PREPARE SURFACE	32. PAINTING	33. CLEAN FANS & VENTS		
1-129- 2-Q Post Office																	
1-123- 2-Q Barber Shop																	
1-103- 2-Q Ptbl Wtr Flng Sta																	
Rainclothes LKR																	
CG LKR																	
1- 61- 2-Q El. Coolg Eqmnt Rm																	
1-105- 1-Q Ptbl Wtr Flng Sta																	
1-123- 3-A Misc. Stow Strm.																	
1-123- 1-A Paint Mix & Is. Rm.																	
1-133- 0-A Bosns & Diving																	
2-158- 0-E VDS Machinery Rm																	
2-147- 0-M Torpedo Rm #2																	
1st C1 Lounge																	
2-132-01-L Pass & Aft Drsng St																	
2-132- 0-2 Crew WR SHR & F/S Wtr																	

Decon. Sta. No. 2

Part: B Page: 5 of 10

Instructions: Enter in each cell, i.e., for each task and space, the number of manhours spent on the task and the Division responsible. This is a two-part form.

TABLE 6. (Continued)

Ship: _____ Date: _____ Observer: _____ At Sea: ____ In Port: ____

Space Designation	19. CLEAN MIRROR(S)/ WINDOWS	20. CLEAN SCUTTLEBUTT(S)	21. WIPE DOWN EQUIPMENT	22. CLEAN VENT SCREENS	23. DUMP TRASH	24. TITIVATE	25. CLEAN URINALS	26. CLEAN COMMODES	27. CLEAN WASHBASIN/ UTIL SINK	28. CLEAN SHOWER STALLS	29. CLEAN SHOWER CURTAINS	30. REPLN EXPEND SUPPLIES	31. PREPARE SURFACE	32. PAINTING	33. CLEAN FANS & VENTS		
2- 32- 1-L CPO WR WC SHR SPC & DECSt																	
2-127- 0-L CPO Living Space																	
2-128- 2-L Crew WR & WC																	
2-121- 0-L Passage																	
2- 95-01-L Passage																	
2- 79- 2-L Passage																	
2- 67- 4-L Passage																	
2- 64- 2-Q Oper Dept. Office																	
2- 61- 2-Q Unit CDR Office																	
2- 61- 4-Q WPNS Dept Offc																	
2- 54- 0-Q Eng. Dp. Offc, Dmg Control																	
2- 54-01-L Passage																	
2- 45- 2-L Passage																	
2- 41- 2-Q Fan Room																	
2- 47- 0-L Crew WR WC SHR & FW & SW Decon STA #1																	

Instructions: Enter in each cell, i.e., for each task and space, the number of manhours spent on the task and the Division responsible. This is a two-part form.

Part: B Page: 6 of 10

TABLE 6. (Continued)

Ship: _____ Date: _____ Observer: _____ At Sea: ____ In Port: ____

Space Designation	19. CLEAN MIRROR(S)/ WINDOWS	20. CLEAN SCUTTLEBUTT(S)	21. WIPE DOWN EQUIPMENT	22. CLEAN VENT SCREENS	23. DUMP TRASH	24. FITTVATE	25. CLEAN URINALS	26. CLEAN COMMODES	27. CLEAN WASHBASIN/ UTIL SINK	28. CLEAN SHOWER STALLS	29. CLEAN SHOWER CURTAINS	30. REPLN EXPEND. SUPPLIES	31. PREPARE SURFACE	32. PAINTING	33. CLEAN FANS & VENTS		
2- 41- 0-L Crew Rec Rm & RNO B Dr.St																	
2- 29- 0-L Crew Living SP(60)																	
2- 24- 0-L Crew Living Sp(18)																	
2- 16- 2-L Passage																	
2- 5- 0-E Windlass RM																	
2- 44- 1-L Passage																	
2- 54- 1-Q Exec. Offc																	
2- 61- 0-Q Mtnce Cntl Cntr																	
2- 61- 3-Q Supply Dept Offc																	
2- 67- 1-L Passage																	
2- 47- 2-L Passage																	
2- 79- 1-L Passage																	
Laundry																	
2-136- 1-A Laundry Strm																	
2-121-01-L CPO Mess RM & Lng																	

Part: B Page 7 of 10

Instructions: Enter in each cell, i.e., for each task and space, the number of manhours spent on the task and the Division responsible. This is a two-part form.

TABLE 6. (Continued)

Ship: _____ Date: _____ Observer: _____ At Sea: ____ In Port: ____

Space Designation	19. CLEAN MIRROR(S)/ WINDOWS	20. CLEAN SCUTTLEBUTT(S)	21. WIPE DOWN EQUIPMENT	22. CLEAN VENT SCREENS	23. DUMP TRASH	24. TITIVATE	25. CLEAN URINALS	26. CLEAN COMMODES	27. CLEAN WASHBASIN/ UTIL SINK	28. CLEAN SHOWER STALLS	29. CLEAN SHOWER CURTAINS	30. RIPLN EXPEND. SUPPLIES	31. PREPARE SURFACE	32. PAINTING	33. CLEAN FANS & VENTS		
2-132- 2-Q Filter Clng Rm																	
2-121- 2-Q Scullery																	
5-121- 2-T Package Cnvyr Trnk																	
2-107- 1-Q Crew & CPO Galley																	
2-107- 0-L Crew Mess Rm																	
2-61- 1-Q Res. Pub Office																	
3-155- 2-L Passage																	
5-147-01-L Passage																	
5-147-01-L Passage																	
3-155- 1-L Passage																	
3-132- 2-L Passage																	
3-132- 0-L Passage																	
3-132- 1 Unassigned																	
3-135- 1-Q Fan Room																	
3-121- 0-L Crew Living Sp																	

Instructions: Enter in each cell, i.e., for each task and space, the number of manhours spent on the task and the Division responsible. This is a two-part form.

TABLE 6. (Continued)

Ship: _____ Date: _____ Observer: _____ At Sea: ____ In Port: ____

Space Designation	19. CLEAN MIRROR(S)/ WINDOWS	20. CLEAN SCUTTLEBUTT(S)	21. WIPE DOWN EQUIPMENT	22. CLEAN VENT SCREENS	23. DUMP TRASH	24. TIH/VAJE	25. CLEAN URINALS	26. CLEAN COMMODES	27. CLEAN WASHBASIN/ UTIL SINK	28. CLEAN SHOWER STALLS	29. CLEAN SHOWER CURTAINS	30. REPLN EXPEND SUPPLIES	31. PREPARE SURFACE	32. PAINTING	33. CLEAN FANS & VENTS			
3-110- 2-L Passage																		
3- 59- 2-L Crew Living Space																		
3- 54- 2-L Passage																		
3- 45- 0-L Crew Living Space																		
3- 37- 0-L Passage																		
3- 29- 2-Q Fan Room																		
3- 37- 1-Q Fan Room																		
5-153- 2-A WR Strm																		
5-147- 2-A Trunk Rm																		
5-155- 5-A Misc. Strm																		
5-147- 1-A SPL Clothing Strm																		
3-118- 2-A Mo. Petr. Eq. Strm																		
5-155- 6-A Crew & CPO Bag Rm																		
5-147-01-L Passage																		
5-153- 2-A WR Strm																		

Part: B Page: 9 of 10

Instructions: Enter in each cell, i.e., for each task and space, the number of manhours spent on the task and the Division responsible. This is a two-part form.

TABLE 6. (Continued)

Ship: _____ Date: _____ Observer: _____ At Sea: ____ In Port: ____

Space Designation	19. CLEAN MIRROR(S)/ WINDOWS	20. CLEAN SCUTTLEBUTT(S)	21. WIPE DOWN EQUIPMENT	22. CLEAN VENT SCREENS	23. DUMP TRASH	24. TITIVATE	25. CLEAN URINALS	26. CLEAN COMMODES	27. CLEAN WASHBASIN/ UTIL SINK	28. CLEAN SHOWER STALLS	29. CLEAN SHOWER CURTAINS	30. REPLN EXPEND. SUPPLIES	31. PREPARE SURFACE	32. PAINTING	33. CLEAN FANS & VENTS		

Part: B Page: 10 of 10

Instructions: Enter in each cell, i.e., for each task and space, the number of manhours spent on the task and the Division responsible. This is a two-part form.

of the spaces. The data will be taken on the form shown in Figure 6. (Data takers will not use the portion of the form dealing with tasks and times.)

Specially briefed and/or trained personnel* will make inspections using, in some cases, visual inspection standards developed for this test. One example of this might include a set of carpet samples showing different levels of soiling and degradation. The inspector would be required to compare the carpet in a particular space to the degraded samples to estimate level of degradation.

As with the previous hypothesis evaluation, pre- and post-test measures will be taken and compared. The use of similar data from other ships of the same class is not feasible unless (1) an equivalent team of judges inspects the vaious ships, (2) the initial condition of spaces aboard the different ships is judged to be equivalent at the beginning of the study, and (3) manning, operating requirements, geographic location and ships' schedules are equivalent. For this reason, "across ship analysis" of cleanliness and appearance of shipboard spaces will not be performed. It is emphasized here that numerical ratings for each space as an entity for all spaces dealt with as the "total ship" and for aspects of spaces (e.g., carpets, tiles, etc.) will be obtained and compared in this study. A brief look at the factors affecting these numerical ratings seems to be in order here.

First, it is anticipated that the numerical ratings will probably reflect the effects of the innovations, this being one of the major hypotheses of the study.

Second, reason dictates that the ratings will be a function of the amount of time spent on the space by facilities maintenance personnel – that is, the more time spent cleaning an area, the cleaner it should appear (within limits, of course). Yet, another hypothesis of this study is that time-to-perform wil be reduced.

Third, the ratings will be affected by the amount of use an area receives, e.g., foot traffic. It is possible for a space to have been cleaned in the early morning but, because of special circumstances (e.g., a fueling evolution), it could be inspected at noon and found to be in poor condition.

Finally, the ratings are bound to be affected by the person(s) rating the space.

For all of the above reasons, it is deemed desirable to select a set of spaces for special data collection and consideration*. The spaces tentatively selected include one crew berthing area, one officers' stateroom, the wardroom, the chiefs' lounge, and one passageway. The purpose of considering these spaces separately is to ensure that (1) the interactions among workload, appearance, special use conditions, and raters can be experimentally controlled and (2) the effects of the innovations can be determined.

For each of these spaces, it will be necessary to record exactly how much time was spent on each task required for the space. Provisions will also be made for the collection of data concerning who did the inspection, special circumstances of use (e.g., extra heavy traffic), surface renewals, and other qualitative relevent information.

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*It is anticipated that personnel form COMCRUDESGRUTWO/DESDEVGRU, NSRDC, and NPRDC will take these data.

*Inspections in these spaces will be more frequent and will be rotated on a random basis so that the FM team cannot anticipate when inspection will be made.

Quantitative data on facilities maintenance actions in these spaces will have to be precise enough to make comparisons with respect to rates of work (e.g., so many square feet of buffing or vacuuming per unit of time), both before and after the innovations have been made. The data for these spaces will be recorded using the entire form shown in Figure 6.

c. Hypotheses # 3:

Attitude and work motivation of personnel performing facilities maintenance work will improve as a result of the innovations.

Dependent measures for evaluating this hypothesis will be numerical scores of specially designed questionnaires concerning attitude and motivation.

The questionnaires will be administered aboard the test ship prior to installing any innovations. Additionally, identical questionnaires will be administered aboard other ships of the same class to determine the degree of equivalence of the subjects to whom the questionnaires are administered (personnel with facilities maintenance responsibilities). The first draft of this questionnaire appears in Appendix B.

After the innovations have been installed and operating, the same questionnaires will be administered to all personnel who previously participated (test ship and other ships).

Comparisons across ships and within the test ship will indicate changes in attitude and motivation attributable to the innovations.

d. Hypotheses # 4:

Facilities maintenance personnel will exhibit superior skill and knowledge regarding facilities maintenance requirements, techniques, materials, procedures, and equipment after innovations have been implemented.

The primary dependent measure for this hypothesis will be a specially designed facilities maintenance knolwedge test to be administered in the same manner as the questionnaires on the previous hypothesis (Appendix C).

Additionally, personnel ratings by supervisors will be obtained and compared to determine if job performance effectiveness improves after the innovations are made (Appendix D).

e. Hypotheses # 5:

There will be no degradation to operational readiness, safety, and manpower availability directly attributable to the innovations.

The dependent measure here will be special incident reports which ascribe problems to the changes installed on the ship. The information obtained will be qualitative in nature (Appendix E and Figure 1).

All equipment and materials to be installed on the test ship will be carefully controlled and monitored. Special storage space will be made available by the test ship and records of withdrawals and returns of equipment will be kept. It is anticipated that the Boatswains Mate Chief will be responsible for the gear and will assign the locker function to one man on a full-time basis. An equipment Draw Log will be maintained (Figure 5).

Training records for FM personnel will also be maintained. The records will indicate, for each FM team member, the dates upon which training program modules were administered (Figure 7).

Major Study Events

- The Commanding Officers and staffs of the ships will receive orientation briefings concerning all candidate concepts and proposed testing.
- An organization for data collection (consisting of research staff and some ship's force or staff) will be established and members of the organization will be briefed on data collection devices and methods.
- Data will be collected at sea for 1 week, using the checklists, rating forms, etc.
- Working sessions with ship's staff and crew of the experimental ship will be established and installation tasks shall be apportioned and implemented. Organizational changes and physical alterations will be accomplished.
- Training, both formal and on-the-job, will be administered to members of the facilities maintenance team. Entire ship's force will be briefed on the program.
- Following completion of all installations, a 2-week "pilot" deployment will take place to identify and resolve difficulties encountered with the concepts (organizational problems, procedures, etc.) and with procedures for collecting data.
- Final deployment for formal data collection will occur following resolution of the problems. Both ships will be deployed and attempts will be made to keep environmental conditions similar. Measurements will be taken in accordance with individual procedures and schedules in Appendices A through F.
- All test data will be compiled, following testing. They will be analyzed and compared in accordance with the data analysis plan.

Requisites

- Timely access to USS TRIPPE and at least one other DE 1052 class ship must be permitted for data collectors and orientation teams.
- Enlisted personnel must be available in groups for baseline measurement of skill/knowledge and attitudes.
- An officer from the ship's complement, preferably the First Lieutenant, must act as liaison among the members of the research team and the ship.

Design and Data Analysis

Table 7 presents an overview of the study hypotheses, devices, and comparisons.

Primary design considerations for this study include the fact that changes in behavior/attitude occurring over time (as a result of experimental treatment) are of interest and the fact that the experimental group and control group are not equivalent. On the basis of these considerations, observations and measurements for both groups will occur prior to implementation of the set of concepts aboard the experimental ship. Subsequently, the concepts will be implemented aboard USS TRIPPE and observations and measurements will be taken aboard both ships at specified intervals. This basic design has been referred to in the literature as a nonequivalent control group design (Campbell and Stanley, 1970).

TRAINING RECORD (insert dates of training in each cell)																		
TRAINEE NAME	MODULE																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Figure 7. FM Training Program Training Record.

TABLE 7. AN OVERVIEW OF HYPOTHESES, DEVICES AND COMPARISONS

HYPOTHESES	DEVICES	COMPARISONS
#1 – Facilities maintenance hours and effects of equipment innovations.	Returned Job Information Cards (figure 2) Work sample (figure 6) FM Manhours Data Format (table 6) Equipment/Materials Evaluation form (Appendix A)	Pre- and post-installation aboard test ship and test ship vs. control ship.
#2 – Appearance and cleanliness	Facilities Maintenance Performance Data (figure 6)	Pre- and post installation periods aboard test ship.
#3 – Attitude and motivation	Attitude and Motivation Questionnaire (Appendix B) Supervisor Questionnaire (Appendix D)	Pre- and post installation aboard test and control ship.
#4 – Skill/knowledge	Facilities Maintenance Knowledge Test (Appendix C)	Pre- and post-installation aboard test ship.
#5 – Degradation	Special incident report (Appendix E and figure 1)	Qualitative evaluation during post installation aboard test ship.

Statistical analyses of data will include, but not be limited to two-way analyses of variances for the following:

- Knowledge test scores
- Attitude scores
- Workload
- Appearance ratings for ship spaces
- Performance ratings for FM personnel

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APPENDIX A

FACILITIES MAINTENANCE EQUIPMENT/MATERIAL

EVALUATION FORM

FACILITIES MAINTENANCE EQUIPMENT/MATERIALS EVALUATION FORM

Rater ID _____ Div. _____ Date _____

1. Use Time

Listed below are all of the new equipment/materials used for facilities maintenance. Please indicate in the "Time of Use" column next to each equipment/material item, the average number of hours you personally spent on the item each week, e.g., if you used a floor scrubber for, on the average, ½ hour per week, insert .5 in the "Time of Use" column.

2. Overall Rating

Next, in the "Overall Rating" column, insert the appropriate number to indicate your evaluation overall of the item:

Excellent	1	2	3	4	5	6	7	Poor
Saves time, labor, easy to use, etc.								Inefficient, hazardous, unreliable.

3. Comparison with Previously Used Equipment/Material

In the column marked "Comparison", insert a + if the new equipment or material item is an improvement over what you used previously. Insert a 0 if it is neither an improvement or degradation. Insert a – if it is worse than what you used previously.

4. Remarks

Finally, in the "Remarks" column, indicate, in your own words, any problems such as "can't get when needed," "doesn't work, difficult to operate," "too bulky," etc. If you need more space, write the number of the item on the reverse of the page and insert your additional comments.

EQUIPMENT	TIME OF USE	OVERALL RATING	COMPARISON	REMARKS
1. Hydro-tech Pressure Washer System				
2. Ton Schrader Wall Deterger				
3. Hudson pressure sprayer				
4. 3M Doodlebug				
5. 3M Brown Pad				
6. 3M Red Pad				
7. Pullman Tank Vacuum				
8. Advance Upright Vacuum				
9. Advance Carpet Shampooer				
10. Dupont Dri-Lux Spreader				
11. Dupont Rug Scrubber				
12. Square Buff Machine				
13. Owatonnal Trash Compactor				
14. Swab Bucket and Wringer				
15. Rayon Swabs				
16. Toilet Bowl Swabs				
17. Broom (corn)				
18. Deck Scrub Brushes				
19. Spray Bottle				
20. Rubber Gloves				
21. Lacquer Brushes				
22. 12" Squeegee				
23. Bucket, oval				
24. Dust Mop				
25. 3M Dri Strip				
26. Carpet Stain Remover				
27. Detergent Sanitizer				
28. 3M Shampoo				
29. Dupont Dri-Lux Chemical System				
30. Johnson's "Complete"				
31. Von Schrader Wall Detergent				
32. Lacquer Rubbing Compound				
33. Lacquer				
34. Heavy Duty Detergent				
35. General Purpose Detergent				
36. Compactor Deodorant Cake				
37. Compactor Plastic Bags				
38. Dust Mop Treating Compound-Sprayed				
39. Descaling Compound				

APPENDIX B

FACILITIES MAINTENANCE STUDY QUESTIONNAIRE

Developed by Mr. R. Sniffin (NPRDC). Theoretical aspects are discussed in a report dealing with evaluation of the Ship Controlman Concept (NPRDC TR 75-17).

Personnel Identification No.: _____

FACILITIES MAINTENANCE STUDY QUESTIONNAIRE

In this questionnaire, we will be asking you a number of questions about how you feel about your job, the Navy, and many related things. The information you provide will be kept strictly confidential, so please try to be accurate in your responses.

There are three main parts to this questionnaire. The first asks you about your general feelings towards a number of jobs, ratings, and assignments. In the next two sections, we ask you more detailed questions about these things. It should take you less than an hour to complete the entire questionnaire. If you have any questions, feel free to ask the person administering the questionnaire. Thank you.

BACKGROUND

1. SHIP: USS _____
2. DATE: _____
3. RATE/RATING: _____
4. YEARS IN SERVICE: _____
5. ENLISTMENT: FIRST _____ SECOND _____ THIRD OR MORE _____
6. PRESENT SHIPBOARD ASSIGNMENT: _____
7. TIME ON PRESENT ASSIGNMENT: _____
8. EXPECTED REASSIGNMENT OR RELEASE DATE: _____

PART I

In this section we would like some information on how you feel about your career in the Navy and your plans for the future.

SECTION A

Using the scale below, rate the overall satisfaction you feel or think you would feel as a member of the three different types of organizations listed below.

Extremely Unsatisfied — 0 1 2 3 4 5 6 7 8 9 10 — Extremely Satisfied

1. How satisfied do you currently feel with the Navy as an organization: _____
2. How satisfied would you feel as an hourly production worker in a large corporation like G.M.? _____
3. How satisfied would you feel as a production worker in a small town manufacturing plant? _____

SECTION B

Using the same scale as above, rate the overall satisfaction you feel, or think you feel, in the ratings shown below.

1. Boiler Technician (BT) _____
2. Storekeeper (SK) _____
3. Quartermaster (QM) _____
4. Boatswain's Mate (BM) _____
5. Signalman (SM) _____
6. Electronic Technician (ET) _____
7. Steward (SD) _____
8. Hull Technician (HT) _____

SECTION C

Again, use the scale above to rate the overall satisfaction you feel, or think you would feel, in the different job assignments.

1. Facilities Maintenanceman _____
2. Helmsman _____
3. Mess Cook _____
4. Lookout _____

SECTION D

Circle the number of the statement that best describes your career intentions at the present time.

1. Definitely will leave
2. Uncertain, but probably will leave
3. Undecided
4. Uncertain, but probably will stay
5. Definitely will stay

How much as your present shipboard assignment affected your decision about your career with the Navy?

1. Not at all
2. Some
3. Very much

My best estimate of the number of years I will stay in the Navy is: less than 5___, 6-10___, 11-15___, 16-20___, 21-30___.

SECTION E

Circle the number of the statement that best describes your intentions about your rating.

1. Plan to submit a Special Request Chit to change my present rating.
2. Am considering the submission of a Special Request Chit to change my present rating.
3. Not really sure what I will do about my rating.
4. Have no intention of requesting a change in rating at this time.
5. Plan to remain in my present rating during my Navy tenure.

SECTION F

Circle the number of the statement that best describes what you might do about this or your next assignment.

1. Plan to request my leading Petty Officer to change the nature of my present assignment.
2. Will probably try to avoid getting another assignment like the present one.
3. Not really sure about this assignment.
4. Have no objections to getting a future assignment that is similar to the one I have now.
5. Plan to try to remain in my present assignment as long as possible.

SECTION G

In this section we would like to know something about what you do in your job. Below is a list of ten things you might have done on your job in the last 2 months. Using the scale shown below, estimate how often you think you have done each thing on the list in the last 2 months and put the appropriate scale number next to each statement.

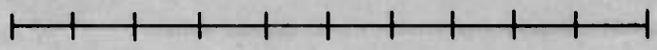
Never 0 1 2 3 4 5 6 7 8 9 10 Always
Sometimes

1. Voluntarily use liberty or after-working hours to work on useful tasks, in addition to fully using work time. _____
2. Voluntarily use normal breaks and meal time to work on useful tasks in addition to fully using work time. _____
3. During working hours, complete assigned work early and then begin working a new task or ask for a new assignment. _____
4. During working hours, complete assigned work early and then wait for next assignment. _____
5. During working hours, take as much time as possible to complete assigned tasks. _____
6. Seek assistance from others to help complete my assigned task. _____
7. Delay working on assigned tasks as long as possible. _____
8. Avoid being given task assignments. _____
9. Find ways to be away from workplace. _____
10. Don't work on assigned tasks. _____

SECTION H

1. How much control do you have over how often you do the above things? _____

No Control 0 1 2 3 4 5 6 7 8 9 10 Complete Control



PART II

There are many things that can result from any particular job assignment or position. We are going to call these things outcomes. For example, you may find that an outcome of being in the Navy is "a feeling of accomplishment." Also, you may find that your present assignment leads to lots of watch standing.

Below is a list of outcomes that you may have experienced or expect to experience in a wide variety of job assignments in and outside of the Navy. From this list, select the five outcomes that concern you most or are most important in influencing the way you feel about job assignments and write them on the fold-out page next to the letters A through E. The fold-out page for this section is page B-8. Put the most important outcome on line A, the second most important outcome on line B, and so on down to line E. Remember, these are outcomes which concern you the most and influence the way you feel about job assignments; these are not necessarily the ones you like the most.

If there are outcomes that are important to you but they are not on this list, add them to the list and your fold-out page.

_____ Criticism of my work
_____ A feeling of accomplishment
_____ High pay and benefits
_____ Good job security
_____ Lots of watch standing
_____ Monotonous or dull work
_____ Interesting work
_____ Recognition for my accomplishments
_____ Time to get my work done
_____ Lousy working conditions
_____ Valuable job and skill training
_____ Difficult work
_____ Opportunity to work with my friends
_____ Lots of time with my family and/or friends
_____ A say in rules that affect me
_____ Lots of free time off the job
_____ Promotion opportunities
_____ Unusual working hours
_____ Lots of liberty or leave
_____ "Dirty" work (special details)
_____ The opportunity to visit interesting places

_____ The opportunity to meet interesting people

_____ Opportunity to direct activities of others

_____ High prestige work

_____ A good retirement plan

_____

_____

SECTION A

For each of the five outcomes you have selected, we would like to know how you would feel if you were to receive it, and how you would feel if you did not receive it. Use the scale below to rate your happiness with receiving each outcome. Put the number on the scale that best describes your feelings next to each outcome question. For example, if receiving Outcome A on your list would make you feel extremely happy, put a 5 in the space next to question 1. Also, if receiving Outcome B would make you feel somewhat bad, you might put a –2.

Extremely Unhappy –5 –4 –3 –2 –1 0 1 2 3 4 5 Extremely Happy

1. How happy would you be to get Outcome A? _____
2. How happy would you be to get Outcome B? _____
3. How happy would you be to get Outcome C? _____
4. How happy would you be to get Outcome D? _____
5. How happy would you be to get Outcome E? _____

Now, using the same scale as above, rate your happiness with not receiving each outcome. As before, put the number on the scale that best describes your feelings next to each outcome question.

6. How happy would you be not to get Outcome A? _____
7. How happy would you be not to get Outcome B? _____
8. How happy would you be not to get Outcome C? _____
9. How happy would you be not to get Outcome D? _____
10. How happy would you be not to get Outcome E? _____

SECTION B

In the last section you told us what outcomes were important to you and how you feel about them. Now we would like you to estimate your chances of receiving each outcome as a result of different job alternatives you might have.

You may feel that your chances of receiving an outcome like being separated from family or friends is very likely by being in the Navy, and not so likely if you worked for G.M. In addition, you may estimate your chances of receiving your Outcome B as very high if you were in a different assignment.

Please estimate your chances of receiving each of your five outcomes for each of the job alternatives listed. Do this by placing the letter of your outcomes in the box which best indicates your estimated chances of receiving each outcome (A-E). An example of what two completed lines might look like is shown below.

EXAMPLE

Chances of Receiving Outcomes

Job Alternative	No Way 0%	10%	20%	30%	40%	50%	60%	70%	80%	Every Time 90%	100%
Owning your own business				A		E		D		BC	
Letter carrier for U.S. Mail Service			AE			B		C	D		

Complete one job alternative at a time; asking yourself: "If I worked in this organization or had this job, what are the chances I would receive Outcome A?" Repeat this procedure through Outcome E. Be sure you use all five outcomes with every job alternative. You may put more than one letter in any box.

If you have any questions please ask.

Please begin on the next page.

Chances of Receiving Outcomes

Job Alternative	No Way 0%	10%	20%	30%	40%	Maybe 50%	60%	70%	80%	Every Time 90%	100%
The Navy as an organization.											
A large corporation like G.M. (as a production worker).											
A small town manufacturing plant (as a production worker).											

SECTION C

Now we would like you to do the same thing for different ratings in the Navy. In other words, estimate your chances of receiving each outcome for each of the ratings listed below, even though you may not be in that rating. Estimate your chances of receiving each outcome for each rating by putting the outcome letter in the boxes like you did on the last page.

Chances of Receiving Outcomes

Rating Alternative	No Way					Maybe				Every Time
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Boiler Technician (BT)											
Storekeeper (SK)											
Quarter-master (QM)											
Boatswain's Mate (BM)											
Signalman (SM)											
Electronic Technician (ET)											
Steward (SD)											
Hull Technician (HT)											

SECTION D

Using the same outcomes and the same process as before, rate your chances of receiving each outcome as a result of different job assignments on this ship.

Chances of Receiving Outcomes

Job Assignment Alternative	No Way					Maybe				Every Time
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Facilities Maintenance-man											
Helmsman											
Mess Cook											
Lookout											

When you have finished with this page, turn fold-out I in and continue with Part III of the questionnaire.

OUTCOMES – FOLD-OUT I

A. _____

B. _____

C. _____

D. _____

E. _____

After you have listed your five outcomes, keep this page open since you will be using it in answering other questions in this section.

PART III

In the previous section, we asked you what outcomes influence you the most in the way you feel about jobs and the chances of receiving these outcomes from different jobs. Now we want to know what outcomes influence how you spend your time in your current assignments.

Look the following list of outcomes over, then choose the five outcomes that are most important in influencing how you choose to spend your time in your assignment and write them on Fold-out II (page 18). As before, choose the most important one first and so until you have filled in the five lines (A-E) on the foldout page. Feel free to add outcomes to this list and the foldout page if they are more important to you than the ones listed below.

_____ Lots of liberty or leave
_____ Criticized for my work
_____ Good relationships with the guys on the job
_____ A feeling of accomplishment
_____ A say in how the work gets done
_____ High production
_____ Docked pay
_____ Lots of watchstanding
_____ A demotion
_____ Monotonous or dull work
_____ An effective unit
_____ Interesting work
_____ A choice in task assignment
_____ Recognition for my performance
_____ Help from the top in getting good school or job assignments
_____ Time to get my work done
_____ Lots of "dirty" work (special details)
_____ A say in rules that affect me
_____ Lots of busy work
_____ Additional work
_____ A promotion
_____ Opportunity to work with my friends
_____ Lots of free time off the job
_____ Time with my family and/or friends

_____

_____

SECTION A

For each of the five outcomes listed on Fold-out II, we would like to know how happy you would feel if you were to receive it, and how you would feel if you did not receive it. As before, use the scale below to rate your happiness of receiving each outcome. Put the number on the scale that best describes your feelings next to each outcome question.

Extremely Unhappy	−5	−4	−3	−2	−1	0	1	2	3	4	5	Extremely Happy

1. How happy would you be to get Outcome A? _____
2. How happy would you be to get Outcome B? _____
3. How happy would you be to get Outcome C? _____
4. How happy would you be to get Outcome D? _____
5. How happy would you be to get Outcome E? _____

Now as before, using the same scale as above, rate the desirability of not receiving each outcome. As before, put the number on the scale that best describes your feelings next to each outcome question.

7. How happy would you be not to get Outcome A? _____
8. How happy would you be not to get Outcome B? _____
9. How happy would you be not to get Outcome C? _____
10. How happy would you be not to get Outcome D? _____
11. How happy would you be not to get Outcome E? _____

SECTION B

In this section we would like to know what you think your chances would be of getting each of the five outcomes you have just selected if you did each of the things listed below. This is the same list of things we asked you about in Part I of this questionnaire.

Using the boxes below, estimate your chances of receiving each outcome (A-E), if, for the majority of the time, you did what each statement says. For each statement below ask yourself: "If I did this most of the time, what are the chances I would receive outcome A?" Put the letter A in the appropriate box for that statement, then consider outcome B. Continue estimating your chances of getting each outcome for a statement before moving on to the next statement. You should have all five outcome letters (A-E) in the boxes for each statement. You can put more than one letter in a box.

EXAMPLE

Chances of Receiving Outcome

1. Voluntarily use liberty or after-working hours to work on useful tasks, in addition to fully using work time.

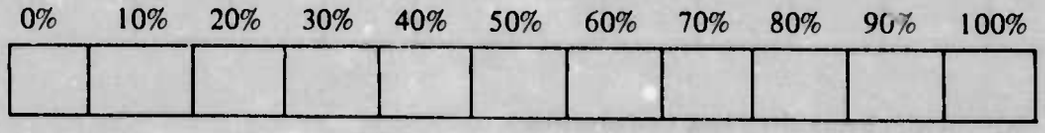
No Way — Every Time

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
E			A		D		BC			

Now turn to the next page to fill in the boxes for each statement presented.

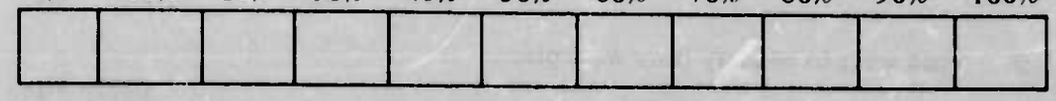
1. Voluntarily use liberty or after-working hours to work on useful tasks in addition to fully using work time.

No Way — Every Time



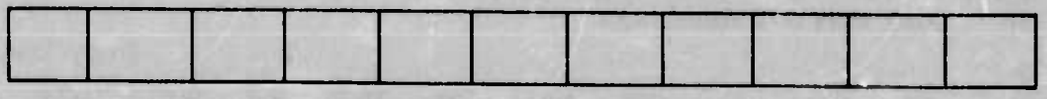
2. Voluntarily use normal breaks and meal time to work on useful tasks in addition to fully using work time.

No Way — Every Time



3. During working hours, complete assigned work early and then begin working a new task or ask for a new assignment.

No Way — Every Time



4. During working hours, complete assigned work early and then wait for next assignment.

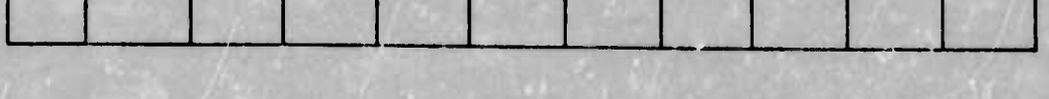
No Way — Every Time

5. During working hours, take as much time as possible to complete assigned tasks.

No Way — Every Time

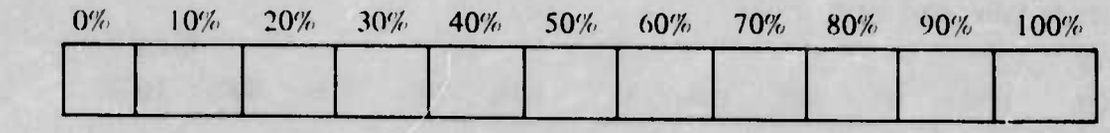
6. Seek assistance from others to help complete my assigned task.

No Way — Every Time



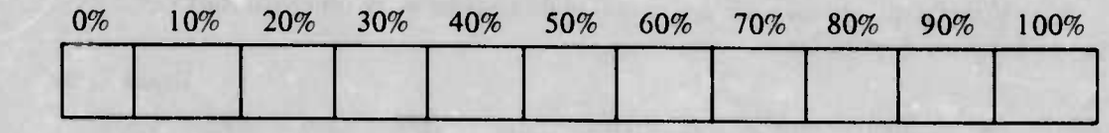
7. Delay working on assigned tasks as long as possible.

No Way — Every Time



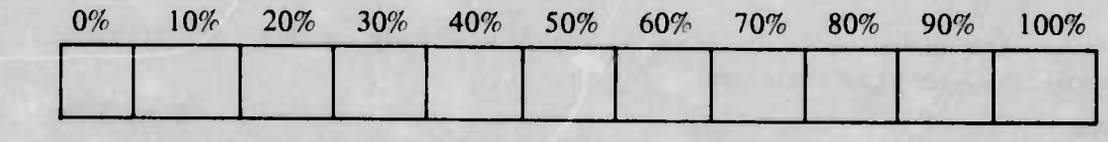
8. Avoid being given task assignments.

No Way — Every Time



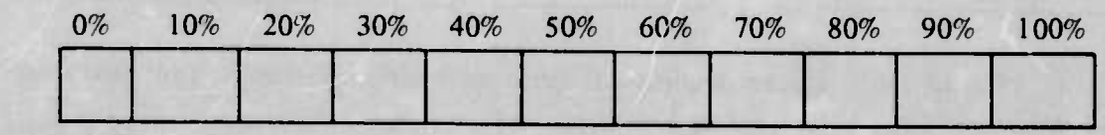
9. Find ways to be away from workplace.

No Way — Every Time



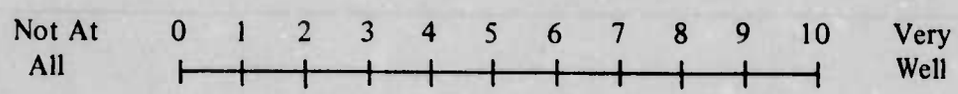
10. Don't work on assigned tasks.

No Way — Every Time

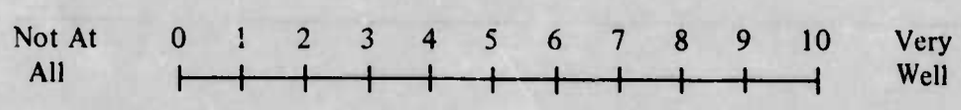


PART IV

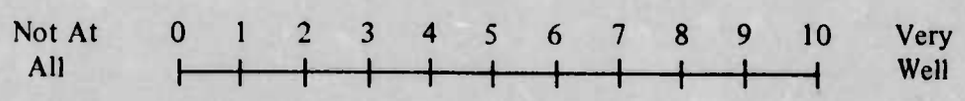
1. Using the scale below, how well do you feel the outcomes used in this questionnaire are ones that actually influence your job preferences and behavior? (circle one)



2. How well do you feel this questionnaire represents the different ways you may spend your time on your job? (circle one)



3. Generally speaking, how well do you feel this questionnaire represents the way you think about jobs? (circle one)



4. What things might influence the way you feel about jobs that were not mentioned in this questionnaire?

OUTCOMES – FOLD-OUT II

A. _____

B. _____

C. _____

D. _____

E. _____

APPENDIX C

FACILITIES MAINTENANCE KNOWLEDGE TEST

FACILITIES MAINTENANCE KNOWLEDGE TEST

Name: _____ Date: _____

Division Assignment: _____ Ship: _____

Rate: _____ Rating: _____ NEC's: _____

Experience in performing facilities maintenance (yrs/mos): _____

General Information

This is a test to determine your knowledge of at-sea facilities maintenance, tasks, procedures, principles, equipment, and materials.

Results of this test will not be used in assessing your qualifications for advancement in rate or rating, and will not, in any way, affect your Navy career.

Instructions

You will have 50 minutes to complete this test. If you do not understand a question, go on to the next one. Return to incompleted questions after you have finished the entire test.

For the multiple-choice question or true-false question, you are to mark the appropriate area of the answer sheet. Go through the sample items below now to make sure that you understand how to mark your answers.

1. Which of the following places is subject to the accumulation of water?

    a. Sumps
    b. Bilges
    c. Tank tops
    d. Bottom sections of machinery spaces
    e. All of the above

The correct answer to question 1. is "e. all of the above." Therefore, the mark on the answer sheet would be placed under "e."

Please mark only one block and make your marks heavy under the answer that is best suited for the question. If you must erase, do it completely.

Do the next sample question to be sure you understand the method of marking your answer:

2. Facilities maintenance includes surface preparation, corrosion control, painting, and maintaining cleanliness and appearance.

    a. True
    b. False

There are 100 questions in this test. Do not begin until you are told to do so by the test administrator.

1. Pipes under basins in the lavatory areas should be cleaned:

   a. Twice each day
   b. Twice each week
   c. Twice each month
   d. Once each month

2. When cleaning lavatory areas, it is best to start with:

   a. Deck
   b. Commodes
   c. High ledges
   d. Pipes under basins

3. Carpeting should be vacuumed:

   a. Monthly
   b. Daily
   c. Weekly
   d. As needed

4. Upon detecting defects in electrical parts of your equipment, you should:

   a. Make immediate repairs
   b. Exchange the equipment
   c. Report to your supervisor
   d. Continue until the job is finished and make report when returning equipment

5. The top coat of paint may be:

   a. Brushed on
   b. Sprayed on
   c. Rolled on
   d. Any of the above

6. Paint marks on glass can be removed without scratching by wetting and rubbing with a copper coin laid flat.

   a. True
   b. False

7. Each gallon of deck finish gives one coat coverage for:

   a. 300 square feet
   b. 600 square feet
   c. 900 square feet
   d. 1200 square feet

8. Dust mops are useful after spray buffing.

   a. True
   b. False

9. You should empty the vacuum cleaner dustbag/container before each use.

   a. True
   b. False

10. Select the answer which indicates the best sequence of steps for spot-cleaning carpet:

   a. Apply carpet stain remover, pick up excess with scraper or dustpan, apply water from spray bottle, vacuum.

   b. Apply water from spray bottle, pick up excess with scraper or dustpan, apply carpet stain remover, vacuum.

   c. Vacuum, apply carpet stain remover, pick up excess with scraper or dustpan, apply water from spray bottle.

   d. Pick up excess with scraper or dustpan, apply carpet stain remover, apply water from spray bottle, vacuum.

11. Good ventilation within a ship is necessary for the:

   a. Health, comfort and well being of ship's company
   b. Preservation of stores
   c. Efficient operation of equipment
   d. All of the above

12. Swabs should be combed out after use.

   a. True
   b. False

13. Mixing bleach with ammonia or acid procedures:

   a. An explosion
   b. An effective cleanser
   c. Chlorine gas
   d. A red liquid

14. Lavatory fixtures (sinks and faucets) should normally be cleaned using:

   a. Cleaner and brush
   b. Detergent-sanitizer, spray bottle and cloth
   c. Steel wool and soap
   d. Heavy duty detergent solution and cloth

15. Immediately upon skin contact with acids:

a. Report to sick call
b. Wipe the acid off
c. Wash with a flood of water
d. Apply bandage

16. When serious corrosion, for which it is difficult to find a satisfactory explanation, occurs, the facilities maintenance technician should:

a. Apply a light coat of penetrating oil
b. Prepare the surface properly and paint
c. Use primer
d. Notify the supervisor

17. If your carpet shampoo machine is hard to hold back, the brush is set:

a. Too deep
b. Too shallow

18. Descaling acid should be used:

a. Only to control rust and minerals
b. For corrosion and antibacterial control
c. For stripping heavily soiled terrazzo decks
d. For generally heavily soiled areas

19. Men to be employed in cleaning fresh water tanks should:

a. Wear auxiliary breathing devices
b. Be examined by a Medical Officer
c. Take frequent breaks
d. All of the above

20. It is best to use cool water after initial removal of water soluble spills on carpeted areas.

a. True
b. False

21. Which one of the following statements is not a good role for using chemicals?

a. Read and follow the directions
b. Use the right chemical for a given job
c. Dilute chemicals before using
d. Change solution as often as necessary

22. Shampoo solution should not be stored in the tank of the carpet shampoo machine.

a. True
b. False

23. To clean vents and ducts, use a supply of low pressure air, insert an air hose in the ducts, and move it about so that it blows through the trunking.

a. Recommended
b. Not recommended

24. A spray buffing pad can be cleaned by pulling the center of the pad out and using it as a brush.

a. True
b. False

25. Which of the following stains/spots on carpets should be treated with hot water?

a. Soft drinks
b. Coffee or tea
c. Oil or grease
d. Paint

26. Procedures and materials used in waxing, stripping, and buffing are the same for vinyl asbestos tile as they are for terrazzo deck material.

a. True
b. False

27. Emptying and cleaning buttkits is one of the first things to be done in cleaning meeting rooms.

a. True
b. False

28. Which of the following is not required for proper carget shampooing?

a. Carpet vacuum
b. Foam shampooer
c. Scrub brush
d. Heavy duty detergent

29. All paints deteriorate with age.

a. True
b. False

30. To wet the strands of your swab with floor finish will take about:

a. 2 ounces of finish
b. 1 pint of finish
c. 1 quart of finish
d. 1½ quarts of finish

31. Lacquered brightwork should be:

a. Polished using Brasso
b. Rubbed weekly using lacquer rubbing compound
c. Cleaned with a dry or slightly damp cloth
d. Cleaned using a powdered cleanser

32. A broom or brush should not be used to clean the edge of carpeting adjacent to bulkheads.

a. True
b. False

33. The most difficult parts of passageway cleaning are (choose the best answer):

a. Vinyl floor covering, brightwork, bulkheads
b. Ladder treads, non-skid decking, lightbulbs
c. Under bulkhead fittings, hatch coamings, ducts
d. Carpeting, hatch covers, bulkheads
e. Scuttlebutts, brightwork, around fire extinguishers

34. Running rust is caused by:

a. Galvanic action at the location of the rust stain
b. Corrosion underneath the painted surface
c. Rust washing down from corroded steel at a higher level
d. All of the above

35. It is best to start cleaning the head and shower areas by cleaning under the basins first.

a. True
b. False

36. It is most effective to pick up stripper and old finish using:

a. Toweling or dry cloths
b. An upright vacuum cleaner
c. A wet vacuum
d. Swab and bucket with wringer

37. A solvent should be used for periodic cleaning of rubber joints for watertight hatches.

a. True
b. False

38. Galvanized steel should be cleaned with a wire brush.

a. True
b. False

39. Leftover finish should be returned to its original container.

a. True
b. False

40. When scrubbing an area of vinyl asbestos tile after stripping solution has been applied, it is best to allow the surface to dry before pickup begins.

a. True
b. False

41. Primer should be:

a. Rolled on
b. Sprayed on
c. Brushed on
d. Any of the above

42. Rust stains which appear on sound paintwork only require that the surface be washed with warm soapy water or detergent, rinsed in fresh water and dried.

a. True
b. False

43. Agitation of carpet shampoo solution prior to filling the tank of the carpet shampoo machine is recommended.

a. True
b. False

44. Methods of preventing electrolytic corrosion are:

a. Put zinc near a junction of steel and brass and steel
b. Cathodic protection
c. Coat one of the metals with rubber-based paint
d. All of the above

45. Cleaning down to bare metal and renewing the paint system is required:

a. Every 6 months for exterior surfaces
b. Every 6 months for interior surfaces
c. When crazing, cracking, blistering occur
d. When gloss is lost

46. Proper carpet care includes frequent vacuuming, shampooing, and spot cleaning.

a. True
b. False

47. After stripper has been applied to a deck surface, the amount of time required to dissolve the old finish and soil is:

a. 1 minute
b. 5 minutes
c. 15 minutes
d. 1 hour

48. Glass surfaces should be spot cleaned using:

a. Cleanser
b. Regular glass cleaner
c. Soapy water
d. Vinegar and water

49. Dust mop heads should be discarded when heavily soiled.

a. True
b. False

50. Floor scrubbing and stripping equipment is easiest to clean:

a. After stripper has dried
b. With descaling compound
c. Immediately after use
d. Before disconnecting

51. Vents require vacuuming daily.

a. True
b. False

52. When using a floor scrubbing machine in an open deck area, you should try to swing an arc of:

a. No more than 2 feet
b. No more than 3 feet
c. No more than 4 feet
d. No more than 6 feet

53. Once stripper has been applied to an area and starts to dry:

a. Swab the surface with a dry swab
b. More stripping solution should be applied
c. Apply the final finish
d. Spray buff the area

54. The edge of carpeting which is directly adjacent to bulkheads cannot be cleaned efficiently with the regular carpet vacuuming nozzle.

a. True
b. False

55. When sweeping with a straw broom, the same side of the broom should be continuously used.

a. True
b. False

56. In cleaning of heads and showers, the lavatory area should be cleaned last.

a. True
b. False

57. When stripping solution has been splashed onto the bulkhead:

a. It should be removed with a clean damp cloth
b. It should be squeegeed off
c. It should be allowed to dry before removing
d. A wet vacuum should be used for removal

58. Your wet vacuum must be prepared for wet pick-up by:

a. Cleaning the moleskin filter
b. Inserting the wet pan
c. Changing the hose attachments
d. Removing the casters

59. If a spot on the carpet appears oily or is known to be oily, begin treating the spot with:

a. Hot water
b. Cool water
c. Stain remover
d. Heavy duty detergent

60. Normal maintenance of watertight doors, hatches, and scuttles should entail no more than regular inspection, operation and lubrication of hinges and clips, and cleaning of rubber joints.

a. True
b. False

61. Stainless steel surfaces in the head should be dried with squeegee or cloth.

a. True
b. False

62. An alkali such as caustic soda should be used for cleaning aluminum and other structural materials.

a. True
b. False

63. Extra finish should be applied to deck areas where tile has lifted or is missing.

a. True
b. False

64. Aluminum alloys require special facilities maintenance attention.

a. True
b. False

65. When cleaning a water soluble spot from a carpet, use a wet sponge and:

a. Work from the edges of the spill to the middle
b. Work from the middle of the spill to the edges

66. Because aluminum alloys used for ship structures form a thin skin of oxide over their whole surface immediately, pitting cannot get started.

a. True
b. False

67. You should dilute chemicals by adding water to concentrate, rather than concentrate to water.

a. True
b. False

68. If awkward corners are kept clean, the rest will almost look after itself.

a. True
b. False

69. Which of the following is recommended for cleaning the brush of the carpet shampooer?

a. Scraper
b. Hand scrub brush
c. Vacuum cleaner
d. Swab

70. Trafficked sections of carpet should be vacuumed daily.

a. True
b. False

71. The best way to identify an unlabeled substance in a container is to open the container and inhale to determine by the smell what the substance is.

a. True
b. False

72. Using the dry foam shampoo system, it is recommended that you wait before vacuuming at least:

a. 5 minutes
b. 30 minutes
c. 2 hours
d. 24 hours

73. "Stripping" refers to:

a. Method of vacuuming NOMEX carpets
b. Method of applying deck finish
c. Method of cleaning glass
d. Method of descaling commodes

74. At intervals the following items should be cleaned with descaling chemicals:

a. Electrical outlets
b. Pipes under basins
c. Commodes and urinals
d. Shower stalls

75. Doodlebugs are used:

a. To mix detergent
b. To clean baseboards
c. To spray glass cleaner
d. To apply polish

76. When applying deck finish, bubbling or milky appearance means:

a. Too much finish in the swab
b. Too little finish in the swab
c. The solution is too cold
d. The solution is too hot

77. Fire hoses located on the main deck may be used for salt water washdowns.

a. True
b. False

78. Wax and finish stripper tend to remove a little bit of the life from tile every time they are used.

a. True
b. False

79. Bulkheads should be cleaned:

a. From the top down
b. From the bottom up
c. From left to right
d. From right to left

80. Powdered cleansers which dry as crystals are recommended for cleaning terrazzo decks.

a. True
b. False

81. Vertical surfaces in the ward room or office spaces require dusting:

a. Once each day
b. Twice each week
c. Once each week
d. Twice each month

82. The proper way to remove a plug from a receptacle is to:

a. Grasp the plug itself
b. Take hold of the cord and whip it out of receptacle smartly
c. Pull the cord slowly
d. Wear gloves

83. Carpeted deck sections close to bulkheads and furnishing:

a. Should be spot-cleaned frequently
b. Tend to collect soil to a greater extent than main traffic areas
c. Will not need to be vacuumed as thoroughly as main traffic patterns
d. Should be cleaned last

84. Horizontal surfaces in offices, such as table tops and ledges, need dusting:

a. Once each day
b. Twice each week
c. Once each week
d. Twice each month

85. Terrazzo decks, after stripping, generally require:

a. Four coats of finish
b. Six coats of finish
c. Two coats of finish
d. Three coats of finish

86. Spray buffing is part of routine resilient floor care.

a. True
b. False

87. If you have an unlabeled container of solution, it is best to test it on a small corner of carpet.

a. True
b. False

88. For good carpet maintenance, the best way to handle spot-cleaning is:

a. To allow the spot or soil to dry completely before cleaning
b. To follow a monthly routine of thorough carpet shampooing
c. To apply fresh water to a spot, working from the edges toward the middle
d. To clean the spot as soon as heavy soiling occurs

89. Usually, in a tiled office area, the deck would need to be totally mopped:

a. Once each day
b. Twice each week
c. Once each week
d. Twice each month

90. Resilient floors should be wirebrushed to remove encrusted wax.

a. True
b. False

91. Your floor scrubbing machine is built to turn:

a. Clockwise
b. Counterclockwise

92. It is best to loop the cord of your scrubbing machine around your shoulder or body to avoid tangling.

a. True
b. False

93. In stripping a deck area which adjoins a bulkhead, make the first pass:

a. From right to left parallel to bulkhead
b. From left to right, parallel to bulkhead
c. From the bulkhead toward the opposite bulkhead
d. In a figure eight

94. When preparing to apply a new finish to a vinyl asbestos tile deck, plan to put into the bucket:

a. Exactly the amount that you expect to use
b. Just a little less than you expect to use
c. Just a little more than you expect to use
d. Half of the amount you need

95. Working parts of a paint spray gun should be oiled every day it is used.

a. True
b. False

96. After you have stripped a resilient deck, plan to apply:

a. Heavy duty detergent
b. One coat of finish
c. Two coats of finish
d. Descaling compound

97. Water and drain lines and conduits located close to the bulkhead in heads and showers are best cleaned using:

a. Dry cloth
b. Tank sprayer and detergent sanitizer
c. Hand scrub brush and cleanser
d. Damp sponge and cleanser

98. An efficient method of routine maintenance for finishes on terrazzo and vinyl asbestos tile is:

a. Spray buffing
b. Stripping
c. Weekly coats of additional finish
d. Frequent scrubbing

99. In cleaning mess deck areas, it is recommended that you use a cloth to brush dried food residue to the floor.

a. True
b. False

100. Which component is found on a foam carpet shampoo machine?

a. Compressor
b. Fuel tank
c. Vacuum bag
d. Heater element

APPENDIX D

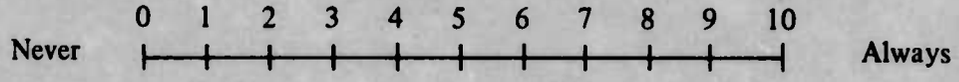
SUPERVISOR'S QUESTIONNAIRE

SUPERVISOR'S QUESTIONNAIRE

This questionnaire is part of the Facilities Maintenance Test Program. The purpose of the questionnaire is to find out something about how the men you supervise go about their work. The information you provide will be used to help us understand the relationship between the attitudes of some of the enlisted personnel on this ship and their work behavior. The men you will be rating have been given a longer questionnaire to fill out on their attitudes towards their work and career in the Navy. All information obtained in this questionnaire will be kept strictly confidential and used only by the research team in conducting the test program.

On the next page you will find a list of ten statements about work behavior and a rating scale. For those men you supervise, rate how often you think they have done each of the things listed in the last 2 months. Use the rating scale for your estimate and put the number in the space provided for each man you supervise.

Statement No.	Statement
1.	Voluntarily use liberty or after-working hours to work on useful tasks, in addition to fully using work time.
2.	Voluntarily use normal breaks and meal time to work on useful tasks in addition to fully using work time.
3.	During working hours, complete assigned work early and then begin working a new task or ask for a new assignment.
4.	During working hours, complete assigned work early and then wait for next assignment.
5.	During working hours, take as much time as possible to complete assigned tasks.
6.	Seek assistance from others to help complete assigned task.
7.	Delay working on assigned tasks as long as possible.
8.	Avoid being given task assignments.
9.	Find ways to be away from workplace.
10.	Don't work on assigned tasks.



	Name:			
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APPENDIX E

FACILITIES MAINTENANCE STUDY

SPECIAL PROBLEM CHECKLIST

FACILITIES MAINTENANCE STUDY

SPECIAL PROBLEM CHECKLIST

The purpose of this checklist is to identify and describe problems related to facilities maintenance on board this ship and to determine the effect of these problems on operational readiness, safety, or performance effectiveness.

Problems to look for include personnel shortages, equipment malfunction, safety hazards or violations, etc.

For each problem event you have noticed (use QM log if possible), fill out the following information:

Date: _____ Time: _____

Location: _____

Nature of Event: _____

_____

_____

_____

_____

Effects on personnel/equipment: (be specific) _____

_____

_____

_____

Remarks/suggestions: _____

_____

_____

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